PROCEEDINGS

OF THE

SIXTEENTH ANNUAL MEETING

OF THE

Florida State Horticultural Society

HELD AT

MIAMI, FLA., MAY 5, 6 and 7, 1903.

WITH AN APPENDIX GIVING
EXTRACTS FROM FORMER REPORTS.

Compiled by the Secretary.

PUBLISHED BY THE SOCIETY.

DeLand, Florida:
E. O. PAINTER & COMPANY:
1903.

Constitution.

Article 1. This organization shall be known as The Florida State Horticultural Society, and its object shall be the advancement of horticulture.

Article. 2. Any person may become a member of the Society by subscribing to the Constitution and paying one dollar. Any person may become a Life Member of the Society by subscribing to the Constitution and paying ten dollars.

Article 3. Its Officers shall consist of a President, three Vice Presidents, Secretary, Treasurer, and Executive Committee of three, who shall be elected by ballot at each annual meeting. After the first election, their term of office shall begin on the first day of January following their election.

Article 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

Article 5. The duties of the President, Vice Presidents, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be, ex-officio, advisory members of the Executive Committee.

Article 6. The Executive Committee shall have authority to act for the Society between annual meetings.

Article. 7. The Constitution may be amended by a vote of two-thirds of the Members present.

By-Laws.

1. The Society year shall be co-extensive with the calendar year, and the annual dues of Members shall be one dollar.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses, shall be paid by the Secretary's draft on the Treasurer, O. K.'d by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics from scientific and practical standpoints, and the Presiding Officr shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures..

Florida State Horticultural Society.

OFFICERS-ELECT FOR 1904.

PRESIDENT:

George L. Taber, Glen St. Mary.

VICE-PRESIDENTS:

Dr. George Kerr, Pierson; G. W. Wilson, Jacksonville;
F. D. Waite, Palmetto.

SECRETARY:

Stephen Powers, Jacksonville.

TREASURER:

W. S. Hart, Hawks Park.

EXECUTIVE COMMITTEE:

Lyman Phelps, Chairman, Sanford; E. S. Hubbard, Federal Point;
E. O. Painter, Jacksonville.

President, Secretary and Treasurer, ex-officio.

Standing Committees.

Citrus Fruits: M. E. Gillett, Tampa; F. G. Sampson, Boardman; G. S. Hardee, Rockledge.

Diseases, Insects and Methods of Control: F. D. Waite, Palmetto; H. A. Gossard, Lake City; P. H. Rolfs, Miami; Dr. F. W. Inman, Winter Haven; W. S. Hart, Hawks Park; C. W. Butler, Saint Petersburg; E. H. Mote, Leesburg; The President and Secretary ex-officio members.

Peaches, Plums and Pears: A. C. Haynes, DeLand; A. B. Harrington, Winter Haven; D. L. Pierson, Monticello.

Grapes, Figs and Kaki: J. Earle Bacon, Ormond; Wm. H. Earle, Tangerine; C. M. Terrell, Hastings.

Pineapples: W. R. Hardee, Jensen; Wm. M. Whitten, Punta Gorda; L. C. Dollins, Orlando.

Tropical Fruits Other than Pineapples: John B. Beach, West Palm Beach; J. C. Carter, Dade City; W. S. Poppell, Estero.

Ornamentals: Mrs. E. O. Painter, Jacksonville; Mrs. A. H. Brown, Manavista; Miss Mary Van Wycke, Federal Point.

Fertilizers and Irrigation: C. M. Conner, Lake City; R. E. Rose, Tallahassee; Guilford M. Wakelin, Lane Park;

Nut Culture: Geo. R. Fairbanks, Fernandina; Mrs. C. W. Jacocks, Formosa; H. S. Graves, Gainesville.

Transportation: Geo. W. Wilson, Jacksonville; E. O .Painter, Jacksonville; Stephen Powers, Jacksonville.

Strawberries: R. K. Muirhead, Pasadena; B. H. Alden, Stetson; W. L. Armour, Panasoffkee.

Entomology: H. A. Gossard, Lake City; P. H. Rolfs, Miami; E. P. Porcher, Cocoa.

Vegetables: E. S. Hubbard, Federal Point; Geo. W. Leonard, Hastings; Johnson Helm, Oneco.

Foresty: C. E. Garner, Jacksonville; Rev. E. V. Blackman, Miami; Dr. Wm. C. Richardson, Tampa.

Revision of Catalogue and New Fruits: H. Harold Hume, Lake City; E. N. Reasoner, Oneco; W. S. Hart, Hawks Park.

Legislation: Geo. W. Wilson, Jacksonville; C. T. McCarty, Eldred; Geo. W. Adams, Thonotosassa; J. A. Crosby, San Mateo; W. M. Bennett, Oklahumpka.

Promotion of Society's Interests, Increased Membership, etc. Mrs. C. T. McCarty, Eldred, Chairwoman, and all the other ladies of the Society.

List of Members.

HONORARY.

Berckmans, P. J., Augusta, Ga.
Flagler, H. M., Saint Augustine, Fla.
Redmond, D., Saint Nicholas, Fla.

LIFE.

Alderman, A. D., Bartow, Fla.
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Barber, C. F., Macclenny, Fla.
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Ellsworth, W. J., Jessamine, Fla.
Francis, Chas. Jr., Interlachen, Fla.
Frink, Aubrey, Glen Saint Mary, Fla.
Gaitskill, S. H., McIntosh, Fla.
Gossard, Prof. H. A., Lake City, Fla.
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Haden, Mrs. Florence P., Cocoanut Grove, Fla.
Harris, E. K., East Palatka, Fla.
Hart, W. S., Hawks Park, Fla.
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Healy, G. P., Jaffrey, Fla.
Hempel, H. A., Gotha, Fla.
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Herff, B. von, 93-99 Nassau St., New York City.
Hopper, Isaac A., Orlando, Fla.
Johnston, S. Weller, DeLand, Fla.
Kerr, Dr. Geo., Pierson, Fla.
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Loehr, F. C., Fort Ogden, Fla.
McCarty, Mrs. C. T., Eldred, Fla.
Merritt, Dr. Jos. C., Orlando, Fla.
Milligan, John W., Apopka, Fla.
Painter, E. O., Jacksonville, Fla.
Painter, Mrs. E. O., Jacksonville, Fla.
Phelps, Rev. Lyman, Sanford, Fla.
Pike, W. N., Floral Park, N. Y.
Racey, Chas. H., Waveland, Fla.
Robinson, M. F., Sanford, Fla.
Rolfs, Prof. P. H., Miami, Fla.
Sartorius, H. G., Seminole, Fla.
Smith, Chas. E., Bogwalk, Jamaica.
Sneden, W. C., Waveland, Fla.
Strauss, J. E., Lealman, Fla.
Stuart, Leon N., Montemorelos, N. L., Mexico.
Taber, Geo. L., Glen Saint Mary, Fla.
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Temple, Mrs. Wm. C., Winter Park, Fla.
White, C. G., Hastings, Fla.
Wilson, Lorenzo A., Jacksonville, Fla.
Woodroffe, Alfred, Auckland, New Zealand.
Worcester, C. H., Pomona, Fla.
Wyeth, J. H., Winter Park, Fla.

ANNUAL.

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Abernathy, Dr. John, Miami, Fla.
Acheson, Miss Robecca P., Mount Dora, Fla.
Adams, A. H., Worchester, Mass.
Adams, C. G., Sorrento, Fla.
Adams, T. H., Dunedin, Fla.
Adams, G.W., Thonotosassa, Fla.
Adams, Mrs. G. W., Thonotosassa, Fla.
Aicher, Dr. F. C., Jupiter, Fla.

Alden, B. H., Stetson, Fla.
Allen, Dr. E. T., DeLand, Fla.
Allen, Hugh C., Maitland, Fla.
Allen, W. I., Jensen, Fla.
Alvers, Mrs. M. A., Sisco, Fla.
Ames, Mrs. M. E., Pomona, Fla.
Amsden, Mrs. E. W., Ormond, Fla.
Amsden, E. W., Ormond, Fla.
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Ankeny, Mrs. J. A., Eldred, Fla.
Ankeney, P. D., Eldred, Fla.
Anno, W. R., Miami, Fla.
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Arnold, H. H., Fairbanks, Fla.
Arnold, R. A., Orlando, Fla.
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Barco, Mrs. E. F., West Palm Beach, Fla.
Barco, G. C., West Palm Beach, Fla.
Barlow, Mrs. L. J., Orlando, Fla.
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Beed, Mrs. John, Bulow, Fla.
Beers, John J. Emporia, Fla.
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Einig, M. E., Sebastian, Fla.
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Fleming, Hubert, Kissimmee, Fla.
Floyd, J. B., Irvine, Fla.
Forster, Frank, Orchid, Fla.
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Grau, W. F., Seven Oaks, Fla.
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Graves, H. S., Gainesville, Fla.
Green, Prof. Frank O., Boynton, Fla.
Green, Louisa A., Orlando, Fla.
Green, W. C., Orlando, Fla.
Greene, Samuel Ward, Micco, Fla.
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Griffing, W. D., Jacksonville, Fla.
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Guller, C. E., Stuart, Fla.
Gurney, L. H., Merritt, Fla.
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Hamm, E. M., Palatka, Fla.
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Hamor, Mrs. A. B., Ankona, Fla.
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Hampton, B. M., Jr., Deerfield, Fla.
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Hardee, E. P., Sebastian, Fla.
Hardee, G. S., Rockledge, Fla.
Hardee, Miss C. Maude, Rockledge, Fla.
Hardee, W. R., Jensen, Fla.
Harkness, Rev. J. W., Jacksonville, Fla.
Harner, J. H., Fruitland Park, Fla.
Harney, W. R., Miami, Fla.
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Harington, Mrs. A. B., Winter Haven, Fla.
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Harris, J. A., Panasoffkee, Fla.
Harris, Mrs. J. A., Panasoffkee, Fla.
Harris, W. H., Tibbals, Fla.
Harris, Mrs. W. H., Tibbals, Fla.
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Hart, Mrs. L. H., Palatka, Fla.
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Hawkins, Walter, care Central of Georgia Ry., Jacksonville, Fla.
Hawks, Dr. J. M., Hawks Park, Fla.
Haynes, A. C., DeLand, Fla.
Haynes, Mrs. A. C., DeLand, Fla.
Haynes, Robert, DeLand, Fla.
Hayward, E. H., DeLand, Fla.
Heard, J. J., Arcadia, Fla.
Heimburger, L., Lemon City, Fla.
Helm, Johnson, Oneco, Fla.
Helseth, O. O., Oslo, Fla.
Henricksen, H. C., Miami, Fla.
Henry, James, Saint Petersburg, Fla.
Hepburn, H. S., Davenport, Iowa.
Herring, Miss Irene, Tallahassee, Fla.
Heyser, Judge E. A., Miami, Fla.
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Hine, J. P., Lake Butler, Fla.
Hine, M. J., Rye, Fla.
Hobbs, Mrs. C. L., Sanford, Fla.
Holder, John, Braidentown, Fla.
Holding, J. M., Hallandale, Fla.
Holland, B. F., Bartow, Fla.
Holly, J. C., Deerfield, Fla.
Holly, Mrs. J. C., Deerfield, Fla.
Holmes, L. C., West Palm Beach, Fla.
Holmes, Dr. G. W., City Point, Fla.
Hooks, J. C., Miami, Fla.
Hopkins, Abbie W., Eustis, Fla.
Hopkins, M. V., Eustis, Fla.
Hopkins, J. L., Mt. Airy, Ga.
Horner, J. W., Miami, Fla.
Houser, Mrs. Theo. G., San Mateo, Fla.
Howard, Dr. Emory E., Sorrento, Fla.
Hoxie, A. E., Saint Petersburg, Fla.
Hoyle, R. F., Miami, Fla.
Hoyt, R. D., Seven Oaks, Fla.
Howes, W. C., Oak Hill, Fla.
Hubbard, E. S., Federal Point, Fla.
Hubbard, Mrs. E. S., Federal Point, Fla.
Hubbard, E. Stuart, Federal Point, Fla.
Hubbard, L. W., Delray, Fla.
Huddleston, C. L., Miami, Fla.
Hudson, F. M., Tibbals, Fla.
Hudson, Mrs. F. M., Tibbals, Fla.
Hudson, Mrs. M. R., Tibbals, Fla.
Hudson, Miss Hattie, Orlando, Fla.
Hudson, Mrs. R. M., Orlando, Fla.
Hudson, J. W., Dade City, Fla.
Hughes, W. D., Miami, Fla.
Hume, Prof. H. Harold, Lake City, Fla.
Hume, Mrs. H. Harold, Lake City, Fla.
Humphrys, Mrs. A. S., Indianola, Fla.
Hutchinson, John T., New Augustine, Fla.
Ingerson, A. L., Miami, Fla.
Ingraham, J. E., Saint Augustine, Fla.

Inman, Dr. F. W., Winter Haven, Fla.
Inman, Mrs. F. W., Winter Haven, Fla.
Irwin, Allen, River View, Fla.
Jackson, Dr. J. M., Jr., Miami, Fla.
Jackson, J. W., Palmetto, Fla.
Jackson, Mrs. M. P., State College, Penn.
Jacocks, Mrs. C. W., Formosa, Mo.
Jennings, Harry, Tibbals, Fla.
Jennings, Mrs. Mary S., Tibbals, Fla.
Johnson, Mrs. Abbie E., Bulow, Fla.
Johnson, C. E., Orlando, Fla.
Johnstone, Mrs. D. W., Tampa, Fla.
Jones, Cyrus, Bowling Green, Fla.
Jones, Rev. C. J. K., Los Angeles, Cal.
Jones, E. R., Cocoanut Grove, Fla.
Jones, J. F., Monticello, Fla.
Jones, J. L., Arcadia, Fla.
Jones, S. B., White City, Fla.
Jones, W. H., Orange Bend, Fla.
Keck, Irving, Bowling Green, Fla.
Keenholt, Miss Susie, Fort Pierce, Fla.
Kelley, J. E. C., Miami, Fla.
Kendig, John, 2,000 Wallace St., Philadelphia, Penn.
Kerr, Mrs. Carrie Lincoln, Pierson, Fla.
King, H. M., DeFuniak Springs, Fla.
Kirkhuff, W. I., Braidentown, Fla.
Klemm, Richard, Winter Haven, Fla.
Klopp, Jonathan, Fort Pierce, Fla.
Klopp, Mrs. Jonathan, Fort Pierce, Fla.
Klopp, Miss May, Fort Pierce, Fla.
Knight, Miss Bertha, Florahome, Fla.
Knox, Donald B., Bulow, Fla.
Knox, L. B., Bulow, Fla.
Kolb, A. J., Miami, Fla.
Kraemer, John F., Miami, Fla.
Lamb, J. A., Palmetto, Fla.
Lane, J. A. P., Miami, Fla.
Lane, John S., Washington Heights, Meriden, Conn.
Lauramore, H. H., Glen Saint Mary, Fla.
Lawson, Ivey, Sebastian, Fla.
Lawson, Mrs. Ivey, Sebastian, Fla.
Lawson, Paris P., Sebastian, Fla.
Lee, J. D., Glen Cove, N. Y.
Lefler, C. D., Miami, Fla.
Lefler, C. H., Sanford, Fla.
Lefler, Miss Peachie, Sanford, Fla.
Leicht, Mrs. Kate T., Newburg-on-Hudson, N. Y.
Leitner, J. F., Columbia, S. C.
Leonard, Mrs. G. W., Hastings, Fla.
Leonardy, Mrs. Flora, Saint Augustine, Fla.
Littlefield, S. C., Little River, Fla.
Lewis, Joseph M., Altamonte Springs, Fla.
Lindsay, J. E., Davenport, Iowa.
Livingston, T. R., Palatka, Fla.
Long, Geo., Boca Raton, Fla.
Lubrecht, Herman, Island Grove, Fla.
Luce, W. W., Tibbals, Fla.
Lummus, J. E., Miami, Fla.
Luttichau, H. von, Earleton, Fla.
Lyman, Austin E., Melbourne, Fla.
McCarty, C. T., Eldred, Fla.
McClung, Miss Bertha, Dunedin, Fla.
McClung, J. M., Dunedin, Fla.
McCoy, Lewis, DeLand, Fla.
McDonald, A., Sanford, Fla.
McDonald, J. A., Miami, Fla.
McElroy, O. C., DeLand, Fla.
McElroy, Mrs. O. C., DeLand, Fla.
McKinnon, H. T., Scotchville, Ga.
McLean, J. H., Palmetto, Fla.
McMullen, G. E., Largo, Fla.
McMullen, J. J., Largo, Fla.
McMullen, M. J., Largo, Fla.
McMullen, R. F., Largo, Fla.
McNary, Charles, Ormond, Fla.
MacVeigh, F. W., Miami, Fla.
McWhirter, Maj. A. J., Citra, Fla.
Mace, J. P., Lake Helen, Fla.
Mace, Mrs. J. P., Lake Helen, Fla.
Mace, Miss Marjorie, Lake Helen, Fla.
Machlan, G. W., Miami, Fla.
Mahon, Mrs. M. B., Lake Helen, Fla.
Mallary, E. Y., Macon, Ga.
Mann, S. B., Glenwood, Fla.
Mann, W. H., Interlachen, Fla.
Manship, Mrs. Bessie, Bartow, Fla.
Maris, Geo. L., Fort Reed, Fla.
Maris, Mrs. Geo. L., Fort Reed, Fla.
Maris, Helen, Fort Reed, Fla.
Marsh, W. E., Miami, Fla.
Marvin, Mrs. Kate B., West Palm Beach, Fla.
Mather, Prof. Thos. W., Miami, Fla.
Mather, Mary, Saint Augustine, Fla.
Mattheny, C. Woodburn, Sarasota, Fla.
May, J. S., DeLand, Fla.
Meares, G. W., Saint Petersburg, Fla.
Meislahn, H., Clarcona, Fla.
Meisterman, Joseph, Orlando, Fla.
Merrick, Rev. S. G., Cocoanut Grove, Fla.
Miller, A. J., Hawks Park, Fla.
Miller, C. Roy, Holly Hill, Fla.
Miller, Mrs. John, Eden, Fla.
Miller, J. W., Crescent, City, Fla.
Mills, R. L., Miami, Fla.
Montgomery, E. S., Miami, Fla.
Moore, Chas. S., Eldred, Fla.
Moore, E. T., Jensen, Fla.
Moore, Mrs. T. V., Jensen, Fla.
Moore, James M., Clearwater, Fla.
Moore, Mrs. Jessie, Cocoanut Grove, Fla.
Moore, J. S., Oviedo, Fla.
Moore, Capt. W. R., Buda, Fla.
Moore, Rt. Rev. C. H., (O. S. B.) Saint Leo, Fla
Morley, C. F., Cocoanut Grove, Fla.
Morris, Joshua, Thonotosassa, Fla.
Morse, Frederic S., Miami, Fla.

Mosttler, Mrs. A. J., Orlando, Fla.
Mote, E. H., Leesburg, Fla.
Mote, Mrs. E. H., Leesburg, Fla.
Mowers, W. H., DeLand, Fla.
Muir, M. G., Newburg-on-Hudson, N. Y.
Muirhead, R. K., Pasadena, Fla.
Munroe, Kirk, Cocoanut Grove, Fla.
Munroe, Mrs. Kirk, Cocoanut Grove, Fla.
Munson, C. D., Eldred, Fla.
Myer, H. van W., Madison, N. J.
Neal, H. N., Palm Beach, Fla.
Neiman, Mrs. A. E., Fort Pierce, Fla.
Nelson, Edwin, Miami, Fla.
Nelson, Mrs. Edwin, Miami, Fla.
Newbold, W. S., Crescent City, Fla.
Nordmann, Ferd, New Smyrna, Fla.
Northrup, J. W., Tavares, Fla.
Nutt, R. L., Tavares, Fla.
O'Brien, Mrs. J., Leesburg, Fla.
O'Brien, W. S., Thonotosassa, Fla.
O'Brien, Mrs. W. S., Thonotosassa, Fla.
Olmstead, Mrs. Claude, Fort Pierce, Fla.
Ong, J. F., Jacksonville, Fla.
Oquin, H. R., Largo, Fla.
Orrell, J. M., White City, Fla.
Overstreet, W. E., Kissimmee, Fla.
Owen, L. J., Cassia, Fla.
Padgett, E. J. M., Leesburg, Fla.
Padgett, H. W., Miami, Fla.
Painter, Mrs. C. A., DeLand, Fla.
Painter, Miss Okle, DeLand, Fla.
Palen, Peter E., Haines City, Fla.
Palmer, R. A., Braidentown, Fla.
Parker, Mrs. J. B., Saint Augustine, Fla.
Parlin, B. A., Miami, Fla.
Partin, J. E., Lake Howell, Fla.
Patterson, S. L., Miami, Fla.
Peck, M. H., Daytona, Fla.
Peck, Mrs. M. H., Daytona, Fla.
Perry, D. W., Pomona, Fla.
Pettigrew, A. J., Manatee, Fla.
Phelps, Mrs. Mary L., Sanford, Fla.
Pierson, D. L., Monticello, Fla.
Pierson, Mrs. D. L., Monticello, Fla.
Pinkerton, Mrs. E. V., Ormond, Fla.
Pitchford, T. J., Miami, Fla.
Player, Harry, care U. S. Eng. Office, Tampa, Fla.
Pomar, Antonio B., care City Clerk, Saint Augustine, Fla.
Pomeroy, Wm., Eldred, Fla.
Pooser, E. B., Jr., DeLand, Fla.
Pope, Mrs. J. H., Miami, Fla.
Popple, W. S., Estero, Fla.
Porcher, E. P., Cocoa, Fla.
Porcher, Mrs. E. P., Cocoa, Fla.
Potter, George W., West Palm Beach, Fla.
Potter, Mrs. Geo. W., West Palm Beach, Fla.
Powers, Stephen, Jacksonville, Fla.
Pratt, Dr. E. E., Limona, Fla.
Pratt, Mrs. E. K., Goodale, Fla.
Prevatt, A. B., Seville, Fla.
Prevatt, J. B., Deerfield, Fla.
Price, C. H., Micco, Fla.
Price-Williams, H., Miami, Fla.
Price-Williams, Mrs. H., Miami, Fla.
Pritchard, James, Titusville, Fla.
Pritchard, Mrs. James, Titusville, Fla.
Pugsley, Chas. Interlachen, Fla.
Purdie, Geo. Alfred, Ormond, Fla.
Putney, E. D., Avon Park, Fla.
Quay, Richard R., Saint Lucie, Fla.
Rabun, D. H. C., Sanford, Fla.
Rader, Rev. L. S., Miami, Fla.
Rawlinson, W. C., Ankona, Fla.
Rawlinson, Mrs. W. C., Ankona, Fla.
Reasoner, E. N., Oneco, Fla.
Reasoner, Mrs. E. N., Oneco, Fla.
Reed, F. L., 1,500 Florida Ave., Jacksonville, Fla.
Reed, Ethel M., Little River, Fla.
Reilly, John B., Miami, Fla.
Rhodes, R. W., Miami, Fla.
Rice, M. A., Citra, Fla.
Rice, Thomas, Cocoanut Grove, Fla.
Richards, C. E., Indianola, Fla.
Richards, Harry W., Stuart, Fla.
Richardson, C. O., Miami, Fla.
Richardson, Dr. Wm. C., Corner Hyde Park & Grand Central Aves., Tampa, Fla.
Roberts, A., Dade City, Fla.
Roberts, Mrs. A., Dade City, Fla.
Roberts, Miss E. H., care Griffing Bros. Co., Jacksonville, Fla.
Robinson, M. M., Florahome, Fla.
Robinson, Mrs. M. M., Florahome, Fla.
Robinson, P. E., White City, Fla.
Robshaw, Chas. Hastings, Fla.
Rollins, C. A., Thonotosassa, Fla.
Rose, R. E., Tallahassee, Fla.
Ross, Mrs. M. C., Palatka, Fla.
Rowe, A. W., Macclenny, Fla.
Rowe, B. H., Macclenny, Fla.
Rowley, S. W., San Mateo, Fla.
Ruffner, H. D., Roseland, Fla.
Ruffner, Mrs. H. D., Roseland, Fla.
Rumph, Edward, C., Miami, Fla.
Rumph, George, Miami, Fla.
Russell, James, Saint Lucie, Fla.
Ryall, W. S., Auburndale, Fla.
Sadler, J. H., Oakland, Fla.
Saeger, A. E., Ankona, Fla.
Saeger, Geo. A., Ankona, Fla.
Saeger, Mrs. Geo. A., Ankona, Fla.
Sample, W. F., Sebastian, Fla.
Sampson, F. G., Boardman, Fla.
Sanders, G. W., Jacksonville, Fla.
Sanders, James, Miami, Fla.
Sartorius, L. G., Seminole, Fla.
Sartorius, Mrs. L. A., Seminole, Fla.

Saunders, Mrs. Geo., Fort Pierce, Fla.
Sawyer, Rev. J. L., Tibbals, Fla.
Schabinger, J. J., Delray, Fla.
Schlisler, Dr. Belle A., Fort Reed, Fla.
Schuyler, Mrs. Chas. S., Jensen, Fla.
Scoggan, W. E., care Crutchfield, & Woolfolk, Pittsburg, Penn.
Scott, Edmund, Arcadia, Fla.
Sellmer, Charles, Zellwood, Fla.
Sewell, E. G., Miami, Fla.
Sewell, John, Miami, Fla.
Shaw, Mrs. H. B., Ormond, Fla.
Shooter, C. C., Earleton, Fla.
Shooter, H., Earleton, Fla.
Short, Mrs. G. W., Tavares, Fla.
Sikes, H. S., Island Grove, Fla.
Simpson, John V., Coleman, Fla.
Sims, Capt. B. M., Ocoee, Fla.
Skinner, Franklin, T., Little River, Fla.
Sligh, Miss Daisy, Miami, Fla.
Sligh, Miss Lillian, Miami, Fla.
Smith, D. C. W., 2022 DeLansey St., Philadelphia, Penn.
Smith, Julius, Miami, Fla.
Smith, Mrs. Paul, care Beckwith & Henderson, Tampa, Fla.
Smith, R. D., The Woodward, 224, Birmingham, Ala.
Smith, Silas, Palatka, Fla.
Smith, T. B., Waldo, Fla.
Smith, Mrs. W. E., 246 S. Charlotte, Saint Augustine, Fla.
Sneden, Mrs. W. C., Waveland, Fla.
Snedigar, Mrs. J. M., Bartow, Fla.
Snow, Geo. E., Eastlake, Fla.
Soar, J. J., Little River, Fla.
Soar, Stephen, Dade City, Fla.
Soar, Martha, Dade City, Fla.
Solana, Alex., Box 384, Saint Augustine, Fla.
Somerville, H., Dunedin, Fla.
Sparks, M. E., Delray, Fla.
Spellman, C. H., Orlando, Fla.
Spellman, J. W., Orlando, Fla.
Spitzer, W. W., Miami, Fla.
Stall, B. E., Magdalene, Fla.
Standiford, R. C., New Martinsville, W. Va.
Standiford, Mrs. R. C., New Martinsville, W. Va.
Stanton, Rev. W. E., Miami, Fla.
Starbird, P. L., Apopka, Fla.
Stebbins, Franklin S., 24 Hamilton St., Rochester, N. Y.
Steinmetz, J. B., Clay Springs, Fla.
Sterling, H. J., Delray, Fla.
Stevens, H. B., Stetson, Fla.
Stevens, J. A., Citra, Fla.
Stewart, Isaac A., DeLand, Fla.
Stewart, Miss Kate, Titusville, Fla.
Stickley, Miss Laura, Strasburg, Va.
Stout, Thos. B., DeLand, Fla.
Street, A. W., Ormond, Fla.
Stuiber, Karl, DeLand, Fla.
Strout, H. T., Fruitland Park, Fla.
Strunk, W. P., Roodhouse, Ill.
Stryker, Thos. H., Rome, N. Y.
Stych, Will E., Miami, Fla.
Stykes, Wm., 87 Prado, Havana, Cuba.
Taber, Mrs. G. L., Glen Saint Mary, Fla.
Taliaferro, Dr. T. H., Lake City, Fla.
Taliaferro, Mrs. T. H., Lake City, Fla.
Talton, E. H., Stetson, Fla.
Tancre, Wm. H., Ankona, Fla.
Tancre, Mrs. Wm. H., Ankona, Fla.
Tarter, C. R., Estero, Fla.
Tash, Delia, P., Sorrento, Fla.
Tasker, Ruben C., Delray, Fla.
Tatum, B. B., Miami, Fla.
Taylor, Lamon, Delray, Fla.
Tenbrook, D. G., Delray, Fla.
Terrell, C. M., Hastings, Fla.
Terrell, Mrs. C. M., Hastings, Fla.
Thompson, C. H., Winter Haven, Fla.
Thomson, John, Clearwater Harbor, Fla.
Thornton, C. B., Orlando, Fla.
Thresher, Miss M., Florahome, Fla.
Tinnie, T. M., Coleman, Fla.
Tischler, P., Jacksonville, Fla.
Tompkies, T. W., Fort Pierce, Fla.
Tompkies, Mrs. T. W., Fort Pierce, Fla.
Tonner, Wm. E., Steubenville, O.
Toppan, E., Georgetown, Fla.
Tourneau, Mrs. J. H. L., Eden, Fla.
Towles, Mrs. F. H., Cocoanut Grove, Fla.
Townsend, J. H., Glen Saint Mary, Fla.
Townsend, G. T., Box 78, Jacksonville, Fla.
Tonwsend, W. L., Box 78, Jacksonville, Fla.
Travis, S. F., Cocoa, Fla.
Tucker, Miss Carrie E., Miami, Fla.
Tucker, Eppes, Jr., Lakeland, Fla.
Tucker, Mrs. Eppes, Lakeland, Fla.
Turner, J. P., New Smyrna, Fla.
Twiss, E. E., Winter Haven, Fla.
Tysen, C. R., Jacksonville, Fla.
Tysen, J. R., Jacksonville, Fla.
Upham, E. S., South Lake Weir, Fla.
Upton, C., Boynton, Fla.
Van Landingham, Dr. B. F., Campville, Fla.
Van Landingham, S. J., Miami, Fla.
Van Wycke, Miss Mary, Federal Point, Fla.
Varn, W. B., Bartow, Fla.
Vaulx, Miss Huetta, West Palm Beach, Fla.
Vaulx, Mrs. Jas. J., West Palm Beach, Fla.
Veronee, E. B., 36 Charlotte, St., Saint Augustine, Fla.
Waddell, E. A., Miami, Fla.
Waite, F. D., Palmetto, Fla.
Waite, Mrs. F. D., Palmetto, Fla.
Wakelin, Amos. 200 Bullitt Building, Philadelphia, Penn.
Wakelin, Miss Grace V., Lane Park, Fla.

Wakelin, Guilford M., Lane Park, Fla.
Waldron, Geo. B., Little River, Fla.
Warner, Dr. J. W., Little River, Fla.
Warner, S. C., Palatka, Fla.
Waterman, Mrs. L. C., Glenwood, Fla.
Waters, J. T., Tibbals, Fla.
Watson, A. S., Braidentown, Fla.
Watson, Capt. C. H., Miami, Fla.
Webb, Mrs. E. L., 1632 Brook St., Louisville, Ky.
Weeks, G. M., Glen Saint Mary, Fla.
Weidman, Jacob, 319 Lexington Ave., Pittsburg, Penn.
Weiland, Chas., 2319 Indiana Ave., Saint Louis, Mo.
Welborn, Mrs. R., Pierson, Fla.
Wells, R. J., Umatilla, Fla.
Welsh, Capt. John H., Miami, Fla.
White, J. J., Rockledge, Fla.
White, Miss L. M., Dupont, Fla.
White, L. W., Ojus, Fla.
Whitten, Wm. M., Punta Gorda, Fla.
Whittle ,J .C., Largo, Fla.
Whittle, Mrs. J. C., Largo, Fla.
Whittle, W. J., Largo, Fla.
Wightman, L., Box 256, Tampa, Fla.
Williams, G. W. M., Miami, Fla.
Williams, H. S., Rockledge, Fla.
Williamson, Joseph, Micco, Fla.
Willman, Mrs. Samuel, Fort Pierce, Fla.
Wills, Francis L., Sutherland, Fla.
Wilson, Geo. W., Jacksonville, Fla.
Wilson, Ralph, Miami, Fla.
Wing, C. W., Bayard, Fla.
Wing, Mrs. J. E., Bayard, Fla.
Wischer, Joseph A., care C. F. Hopkins, Saint Augustine, Fla.
Wise, Miss Effie B., Oakland, Fla.
Witherington, H. H., Apopka, Fla.
Wood, Alice, 117 W. Bay St., Jacksonville, Fla.
Wood, George H., Tangerine, Fla.
Wood, S. A., DeLand, Fla.
Wood, Mrs. S. A., DeLand, Fla.
Woodall, Henry, Saint Petersburg, Fla.
Worcester, Mrs. C. H., Pomona, Fla.
Wright, A. D., Bartow, Fla.
Wyckoff, John S., Citra, Fla.
Wyeth, Mrs. J. H., Winter Park, Fla.
Wylly, Mrs. Geo. W., Fort Reed, Fla.
Ximanies, Miss Beatrice, Miami, Fla.
Ximanies, C. L., Miami, Fla.
Ximanies, George, Miami, Fla.
Ximanies, J. C., Miami, Fla.
Yocum, Mrs. W. F., Lake City, Fla.
Zapf, Mrs. Joseph, 1,064 Park St. Jacksonville, Fla.
Zeder, John A., Delray, Fla.
Zipperer, Raymond, Winter Haven, Fla.

310 members this year

PROCEEDINGS

OF THE

SIXTEENTH ANNUAL MEETING

OF THE

Florida State Horticultural Society.

The sixteenth annual meeting was held at Miami upon the invitation of the city authorities. The Society convened in the County Fair hall on Tuesday, May 5, at 9 a. m., and adjourned sine die on Thursday at 10 p. m. There were present, first and last, over 300 members. The young but vigorous and progressive city of Miami presented the unparalleled record of furnishing nearly 100 members from among its own citizens. More lady members were present than ever before.

MINUTES.

FIRST DAY.

1. Call to order by President Taber.
2. Invocation by Rev. Luther S. Rader.
3. Address of Welcome by Col. W. R. Anno.
5. Report on Local Arrangements.
6. Aubrey Frink and E. Stuart Hubbard appointed assistant secretaries.
7. President Taber's Annual Address.
8. Address on the Education of the Horticulturist, by Dr. W. F. Blackman.
9. Committee on Order of Business, C. T. McCarty, E. O. Painter, W. S. Hart.
10. Committee on Memorial Page, Dr. Geo. Kerr, W. S. Hart, and A. H. Brown.

Afternoon Session.

1. Vote of Sympathy with Rev. Lyman Phelps.
2. Report of Committee on Citrus Fruits, presented by A. H. Brown.
3. Discussion of same.
4. Paper by A. A. Boggs: Culture of the Mango.
5. Remarks by Henry M. Flagler.
6. Report of Committee on Diseases and Insects of the Citrus by E. P. Porcher.
7. Discussion of the same.
8. Paper by Prof. P. H. Rolfs: Probable Results of Draining the Everglades.

Evening Session.

1. Report of Committee on Pineapples, by C. T. McCartv.
2. Report on Fancy Pineapples, by C. B. Thornton.
3. Discussion.
4. Report of Committee on Grapes, Figs and Kaki, by C. F. Barber and H. von Luttichau.
5. Discussion of same.
6. Notes on Celery Culture, by H. H. Chappell.
7. Committee on Nomination of Officers elected—C. T. McCarty, Dr. Geo. Kerr, E. S. Hubbard.
8. Motion by T. A. Carroll, favoring Watson's bill in the legislature as to Agricultural Institute, referred to Committee on Legislation.

SECOND DAY.

Morning Session.

1. Report of Committee on Tropical Fruit Other Than Pineapples, by Rev. E. V. Blackman.
2. Discussion of same.
3. Paper by Prof. W. A. Orton of the Agricultural Department, Southern Wilt Diseases, etc.
4. Discussion of same.
5. Report of Committee on Ornamentals by W. J. Ellsworth, read by Secretary.
6. Report of Committee on Fertilizers and Irrigation, by E. S. Hubbard.
7. Discussion of same.
8. Prof. Rolfs invites members to visit the experiment station, placing a launch at their service.

Afternoon Session.

This was not held. Instead of it, an excursion provided by the citizens was taken on Biscayne Bay.

Evening Session.

1. Announcement that the F. E. C. Railroad Company would refund two cent per mile where conductors had charged full fare.
2. Vote of thanks to Miami for the excursion.
3. Stereopticon Views, Shedded Groves of Florida, on dark lantern slides, with comments by E. O. Painter.
4. Horticulture of Cuba and Jamaica illustrated as above with comments by Prof. P. H. Rolfs.
5. Nitrate Beds of Chili, illustrated as above, with explanations by E. O. Painter.

THIRD DAY.

Morning Session.

1. Report of Committee on Forestry, by Geo. W. Wilson.
2. Discussion of the topic.
3. Report of Committee on Entomology, by Prof. H. A. Gossard.
4. Discussion of same.
5. Report of Committee on Transporta-

Citrus Experiment Station
Lake Alfred, Florida

tion. Notes of progress as to arrangement for rebates.

6. Report of Committee on Vegetables, by C. G. White and Rev. E. V. Blackman.

7. Nut Culture—no report. D. L. Pierson made some remarks on the hybridizing of the chestnut and the chinquapin, from which results of value are expected.

8. Report of Committee on Peaches, Pears and Plums, by W. D. Griffing and B. M. Hampton.

9. Discussion of this topic.

10. Treasurer instructed by the Society to pay rebates for overcharges on F. E. C. Railroad at two cents per mile, take up conductor's receipts and settle with the company.

Afternoon Session.

1. Election of Officers. (See list in front of report.)

2. Election of Henry M. Flagler as honorary member, and Mrs. C. T. McCarty as life member.

3. Jacksonville selected as next place of meeting. A. H. Brown, E. W. Amsden and W. J. Ellsworth, tellers.

4. Reports of Secretary and Treasurer and Executive Committee read.

5. Committee on Legislation reported adverselv on the Watson bill before the Legislature, creating an Agricultural Institute; secondly, favoring a petition to the Legislature to empower the Society to act as a horticultural quarantine force.

6. Committee on World's Fair reported not to recommend an appropriation.

7. Paper by Prof. Hume: Cultivation of Orange Groves, read by Prof. A. W. Blair.

8. Resolution by W. S. Hart adopted, asking the Department of Agriculture to send specialists to study citrus diseases.

Evening Session.

1. Remarks on Prof. Hume's paper.

2. Committee on Damage from Cold, and Best Methods of Prevention. No report.

3. Committee on Strawberries and Miscellaneous Fruits, report by S. Powers.

4. Committee on New Fruits, report by E. N. Reasoner.

5. Report of Committee on Final Resolutions.

6. Secretary read a letter from Secretary Wilson of the Agricultural Department as to the unfinished work on insects, by Prof. H. G. Hubbard.

7. On motion by Mr. Hart, seconded by Mr. McCarty, it was voted to increase the secretary's salary to $100 a year.

8. Committee on Revision of Catalogue reported inability to do the work this year.

9. Final resolutions adopted.

10. Memorial page provided for.

11. Letters of greeting from Dr. D. Redmond, Rev. Lyman Phelps, Capt. R. E. Rose, Prof. H. Harold Hume and Capt. W. A. Cooper.

12. Adjourned sine die.

Address of Welcome.

Col. W. R. Anno.

Mr. Chairman, Ladies and Gentlemen:

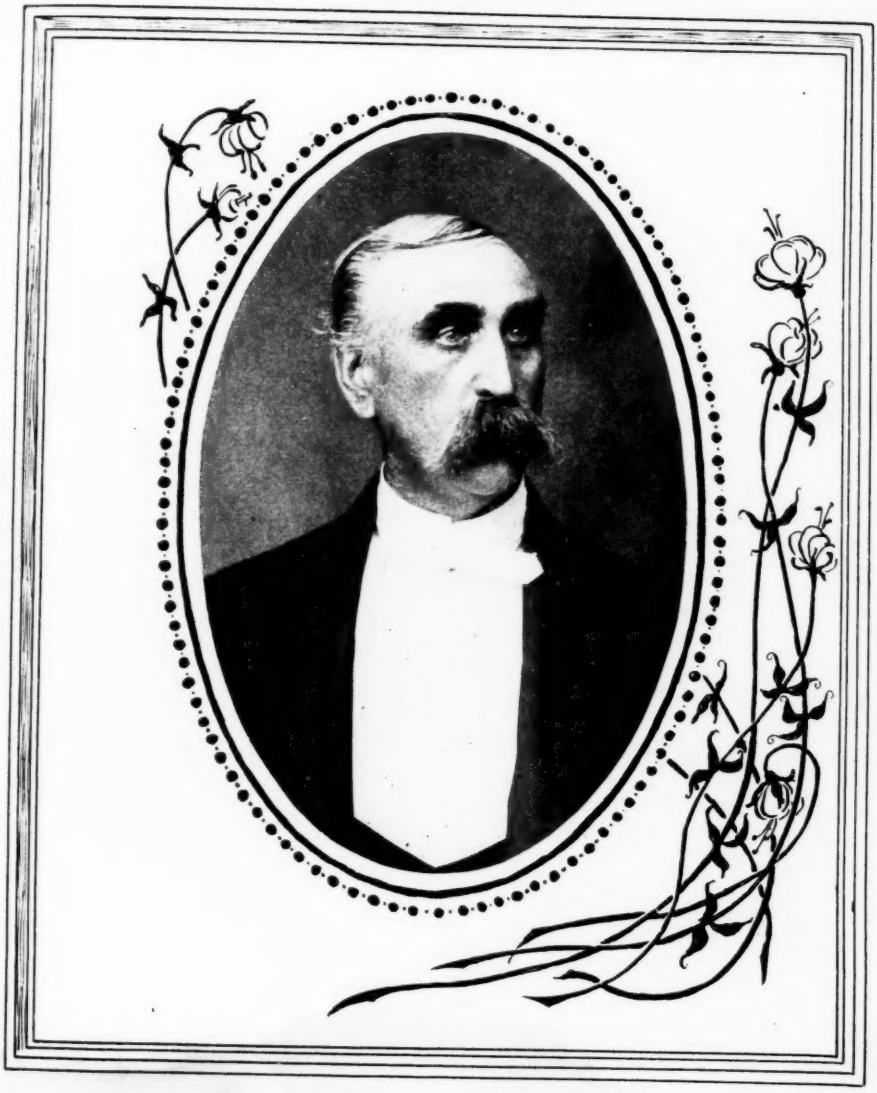
The distinguished honor has been conferred upon me, as a citizen of Miami, to welcome you within our gates. I can assure you that nothing could afford me more pleasure, and I can assure you further that since I have been sitting here looking over this audience, and have seen the faces here, it reminds me of my boyhood, reminds me of the old South long before the war, when the intelligence, the education and the refinement were with the farmer. I can see it coming back again—the intelligence of Florida, its refinement, its education and its influence upon the government of this State and of this country will be in the horticultural and agricultural societies of this State.

I have been in Florida thirty-three years; I came here a consumptive, came here to die then, but am not ready yet. There are no people on the face of the earth, living in this State or any other county of Florida who can enjoy 365 glorious and happy and prosperous days in every year as we enjoy them right here now. We do not want to induce you to leave your homes and come here, but we have entertained here more than fifty thousand people within the last few months, and you will see that they have gone off and told the same story. The story will be told by you, because you are Floridians—a proud name and a bright people. Now, what made us what we are? It has been the indomitable energy, it has been the untiring effort, the zeal, industry and hard toiling on the part of this city and county, associated with the wealth and help of that great and good man, two men, three men, Ingraham, Parrott and Henry M. Flagler. We have done it all with their assistance, and we are still blessed with their assistance. I would to God that every county in Florida had a Flagler and a Parrott in their midst!

We welcome you with cordial greeting. Here are the parks, hotels, rock roads, beautiful drives, magnificent bay, the ocean, all of which we have the enjoyment of 365 days in the year. It is all yours for three more days. Enjoy it to the fullest of your ability—it is yours. I am glad to see so many ladies here present. They will be the inspiration, Mr. President, of your deliberations; they are our helpmeets—sometimes angels here as well as above. The Bible says there will be no marriage in heaven, and I think that a wise provision, for I do not believe there will be enough of us men to go around.

Now, you will see here something you never saw before—an orange grove growing out of a flat rock, a solid rock, and you will be astonished and surprised. You will see wild orange trees growing in the hammocks between here and Cocoanut Grove. We want you to see, and you will not wonder why we are so prosperous and happy.

Now, gentlemen, I hope you will enjoy your visit, and I will say again, in the



REV. E. V. BLACKMAN, THE MEMBER FROM MIAMI.

name of the four thousand people here now, we welcome you to our hearths and homes.

REPORT OF LOCAL COMMITTEE ON ARRANGEMENTS.

Hon. Fred S. Morse, Rev. E. V. Blackman, Hon. C. T. McCarty.

Mr. Blackman—My report will be short indeed, that is to say, the matter of arranging for transportation I took up very early in the season with the railroad companies, to give them time to digest a low rate. The Florida East Coast railroad consented to give us one cent per mile rate, the Georgia Southern and Florida the same. We hoped all the roads in the State would give us the one-cent-a-mile rate; they conceded us a rate of one and a half.

You understand that the steamer excursion was down on the program for Thursday. The boat we engaged for this service was not in condition to go, and we have arranged to go on the steamer Miami which is a much larger steamer, carrying a large number of passengers, on Wednesday at 2 o'clock, therefore all wanting to go must be on the dock at 2 o'clock sharp. Every member is entitled to take this excursion. We will go down to the lighthouse so you can see how it looks down there. We want especially the visiting members of the Society to be with us on that excursion—2 o'clock sharp, not 2:05, but 2 o'clock. You will all feel bad if you are not there and are left behind. Tickets can be secured from Mr. C. T. McCarty, who has them on hand.

Response for the Society.

E. S. Hubbard.

Mr. President, Ladies and Gentlemen:

I rise with pleasure to respond to this cordial address of welcome.

When this youthful, vigorous and enterprising city invited the Florida State Horticultural Society to hold its annual meeting within its gates, we knew it would do nothing by halves, but the heartiness of her greeting, and the bountifulness of her hospitality, surpass our anticipations; and I assure the citizens of Miami their efforts in our behalf will be appreciated.

The horticulturists and agriculturists of this Society came from every part of the State and from every line of industry connected with growing the fruits of the earth and the crops of the field; but our State is both long and wide, and many of us have little acquaintance with the conditions and peculiar lines of effort that prevail in this section. We look with interest at the rock on which the city is founded; on the streets which are builded from that rock; on the fields that are fenced with it; and, lastly, with the greatest interest of all, at the fruits and vegetables that are grown in those fields. We admire the size and luxuriance of the mango, the avocado pear,

the guava, the pineapple. We marvel at the adaptability of the orange that will grow and thrive in holes blasted in this rock; we hear with wonder the accounts of the crops of early vegetables that go forward to market from this section and we envy the mildness of climate that makes that earliness possible. But above all, we admire your natural and artistic surroundings. The bay and harbor that make this port a gatewav to the Indies; the palms and tropical foliage that give an air of romance to your homes; the public and business edifices that show the substantial nature of your city's growth.

In behalf of the Florida State Horticultural Society, I thank Miami for its royal welcome.

President's Annual Address.

G. L. Taber.

Members of the Florida State Horticultural Society, Ladies and Gentlemen:

In welcoming the Society to Ormond in 1892, C. A. Bacon told us in his genial, humorous way, how the town at which we were then convened, "happened to be on the map," and how with the advent of the locomotive "the affrighted deer gave his note of warning, the black bear leaped over the scrub and put for cover, the natives ceased the crack of their whips, their women raised their hands in horror and exclaimed, 'Them Yankee notions have come, where be our cattle and hogs? Light-ud is gettin' scarce; we will put for Miami.'"

Although an astute and far-seeing gentleman, I am sure Mr. Bacon, at that time little thought—and I am equally sure none of the rest of us did—that onlv a decade later the Florida State Horticultural Society, in convention assembled, would vote almost with one voice, to "put for Miami." To be sure, we did not take this action for the good of our "cattle and hogs," or because "light-ud is gettin' scarce," but, in another phase the parallel holds good; the women took the initiative. From time immemorial they have been man's moving cause—as well as his saving grace.

To go a trifle deeper into this matter:

When the reverend gentleman, who so zealously and ably represents Miami's horticultural interest came before this Society at Tampa with pockets bulging full of facts and figures showing Miami's greatness, and entered his plea, backed by an invitation from the citv fathers, there were some among our members who thought his labor would come to naught. They suggested the distance was too great, hinted at possible dynamitic danger after arrival and made other minor and wholly vain excuses. Vain because, in advance, bv wholly honorable, upright and fair methods, the kindly interest and services of the ladies had been enlisted in Miami's behalf and the coup d' etat that developed showed the reverend gentleman to be a general as well.

But generalship lay not alone with the

gentleman from Miami, for another, who has had much to do with the promotion of Florida's interests, quick to discern the quarter in which the balance of power lay, and alert to direct this hitherto unreckoned-with energy into a channel of permanent usefulness to the Society, made a motion that a committee to solicit new members and otherwise promote the Society's interests be established, and that each lady member be placed on this committee. The motion was carried, and as a result of the vigorous campaign carried on by this committee of ladies, with Mrs. C. T. McCarty at its head, the paid membership of this Society is now larger than ever before in its history. Whether the ladies, recognizing the tremendous power thrown into their hands, will press their advantage to what might seem a natural sequence, forcing the gentlemen members to the wall and capturing for themselves all the offices of the Society, and the perquisites that pertain thereto, remains to be determined. In the meantime in the absence of any such avowed intentions on their part the hearty thanks of the Society are due these ladies for making this meeting one of the most pronouncedly successful in the Society's annals; for such we can all see in advance it is bound to be.

A Bit of History.

Ladies and gentlemen, this Society celebrates at this meeting its fifteenth anniversary. We organized at Ocala in 1888 with a charter membership of eighteen. From the beginning the Society has shown healthy growth. We have sailed along smoothly during sunny weather, and we have worked like beavers through storms that tried men's souls; but through it all we have felt the life-blood of action and progress flowing freely through our veins. Although in the beginning we were small in numbers our purpose was, as it is now, the betterment of Florida horticulture and of Florida horticulturists. Among our first official acts we extended invitations to the American Pomological Society and the Georgia State Horticultural Society to meet with us the following year. Both invitations were accepted and at our second annual meeting, held at the Semi-Tropical Exposition building in Ocala, in February, 1889, in the midst of a most magnificent horticultural display, we entertained guests of national horticultural reputation. Who of us in attendance at that Ocala meeting will ever forget the felicitous address of President Adams as he welcomed our Northern visitors? He said, in part:

"On account of universal and sturdy usefulness, by acclamation the apple has been called the 'king of fruits.' So for her sweetness in the bloom of infancy, for her beauty, grace and goodness in the flush of womanly maturity, shall the orange, undisputed, wear the queenly crown. As a loyal subject of our beautiful queen I bid you welcome to this her chosen realm. Here she reigns supreme, and other fruits which in less favored climes would wear a crown are proud to be in her retinue. Her citrus sisters, the lordly pineapple, the peach and pear and grape, the guava, banana, mango, strawberry, kaki and loquat—a horticultural aristocracy of purest blood—are her most loyal and faithful subjects."

Ladies and gentlemen, I am but emphasizing our acknowledgment of the gracious welcome extended us today by the people of Miami when I say that the quoted words with which President Adams welcomed our more Northern visitors to the State at large, would, in great meas-

ure, be applicable today by the people of Miami in welcoming their horticultural kinsfolk from farther up the State to this section.

That this is true of a section which only a few years ago was horticulturally unknown is striking evidence of the rapid strides that horticulture is making within our borders and of the healthy optimism that has made these strides possible.

Something About Optimism.

Now some of you may object to the use of this word optimism, but the sense in which I am using it is, I think, eminently proper. It is that definition given by Webster as follows: "A disposition to take the most hopeful view of things—opposed to pessimism."

In reading from a well known writer a few days ago I was struck with a query and reply which, with your permission, I will quote. The query was, "Why are successful men optimists?" and the answer:

"Because optimists are successful men. Success is not the cause; it is the effect. Optimism is practically applied faith and hope. Also it is energy. (The laggards all are pessimists.) Faith, hope and energy—there is the optimistic standard, and wherever it waves it signals success.

"The optimist goes forth to unlock the door of progress equipped with one great essential, the key, which is the realization that within him lie all the powers there are. All that remains is to find the material on which to use and so develop them. He does not hesitate to wonder if this or that be his mission. He does what his hands find to do. The weight of destiny and fate does not oppress him. He knows that these are makeshifts—words. What is this dummy we call destiny? An excuse for failure, for pessimism, for fear; a rant against our own weak spirit which does not dare and do; a wail of bitterness which should have been a whoop of courage; a surrender to the land as it lies instead of an onslaught on thicket and bramble. We must make our own clearing. We must hew our own path. There is no landscape gardener at work, sodding and graveling and beautifying paths for each of us to follow to some rose-embowered garden at the close. Fate is not done up in prize packages, each labeled with a name. Fate is the fruit of the day's work. We are given a compass and land and sea on which to use it. The journey rests with ourselves.

"The pessimist ignores these truths. He refuses to acknowledge his own responsibility. He acknowledges nothing that is good; he dwells on all that is bad. He does more. He fashions ugly spectres and imbues them with life. He fears them and flaunts them. He is a pest. He is a failure and a fool; a mental and moral and sometimes a physical suicide. And why? Because we assume the image of our idols. Our natures grow with what they feed upon; our characters develop according to the qualities we exercise and those we restrict; and our lives unfold for good or ill, for failure or success, according to the way we handle them."

The Work of Optimists.

Why, ladies and gentlemen, the very fact that the town of Miami is known throughout the country today is the result of optimism. The gentleman who had the faith and nerve to lay iron rails through miles and miles of desolation, in order to open up this and other salient

points on the lower east coast, was and is the most daring optimist this State has ever known. Again, the men of faith and daring, the settlers who followed the advent of the locomotive into this section, were optimists. What they believed it was their part to prove—first to themselves and then to an unbelieving public—that the peculiar conditions which prevailed here were not necessarily prohibitive to the production of fruits and vegetables in ample profusion and of high quality.

And still again this Society, we who have the honor to be the invited guests to this section, are optimists. What but optimism could have given the handful of members organized at Ocala fifteen years ago the faith and hope to believe that this Society would become in fact, what we dared to name it, the Florida State Horticultural Society? And later, what but optimism carried us through the dark days that came upon us when disaster followed disaster throughout the State and enabled us to see the rejuvenated, regenerated, fruiting trees that should and must grow from the frozen stumps?

What but optimism gave to this Society the faith and hope and courage to face exigencies such as had never before fallen in equal measure, upon men engaged in similar pursuit? What but optimism enabled us, in addition to carrying our individual burdens, to institute the most thorough investigations ever undertaken by any organization in this or any other country, toward demonstrating the best methods of tree protection during periods of abnormally low temperatures, like those then upon us?

In short, what but optimism held this Society together and enabled us to accomplish work and place on record results of which any society might be proud, in the face of statements freely made by the pessimists that not only was our Society dead, but that the very horticulture of which we are an exponent was dead in Florida.

Now, I trust none of you will construe whatI have said into the meaning that we have accomplished everything we set out to do and that we can now complacently rest on our laurels. Such is not the idea at all. The kind of optimism that I have referred to, which we have practiced in the past, and which we must practice in the future, contains a large ingredient of action. Action is developed energy and this combined with faith and hopefulness —in a word, optimism—is, to my mind, as necessary to the well being of a society as it is to that of an individual. It is this kind of optimism that will maintain our Society in its present high position among kindred organizations and that will make us eager to cope with and settle, correctly if possible, questions of moment already under consideration, as well as such other questions as may arise in the future. It is this kind of optimism that will make of us individually better men and women and that will impart to others with whom we come in contact the feeling that our living is not in vain.

Our Real Mission.

Our Society is simply a combination of individuals having a common purpose, and if each of us does the best he or she knows how toward lifting the horticulture of the State to a higher level, we shall have done what we can toward accomplishing the primary purpose for which we organized. But let us not forget that, in working toward the accomplishment

ot this primary purpose, the work will be easier and pleasanter and the world in which we live brighter for ourselves as well as for others if we can scatter a little sunshine along the way. Let us as individuals be so imbued with faith, hope, courage and energy that we may impart a little of each of these life-giving and life-worth-living attributes to the man or woman less highly endowed. In short let each of us try to demonstrate that he or she might have been the particular person the poet had in mind when he wrote:

"It is easy enough to be pleasant
When life flows along like a song,
But the man worth while is the one who will smile
When everything goes dead wrong."

Ladies and gentlemen, a glance at our printed program will convince you that we do not expect to be idle at this meeting. We shall have valuable reports from our able standing and special committees and we shall be favored with carefully prepared papers on scientific topics by skilled specialists. A free and full discussion of these reports and papers is desirable. Let us work every available mine of horticultural information that we have with us, until we shall have extracted all the golden nuggets ot thought; and let us not forget that it is as incumbent upon us to give as to receive information. We expect the printed report of this meeting to be, like those that have preceded it, a valuable addition to the horticultural literature of the South, and to those of us in actual attendance our meeting means much more, for no printed record can adequately set forth the amount of good we receive and impart from personal contact at these annual reunions. I heartily endorse and would like to emphasize the following exposition of our tenets as set forth by our former President, Dudley W. Adams, in one of his memorable addresses:

"Besides the growing and marketing of our fruits and the mere making of money the State Horticultural Society hopes to have a beneficial influence. We hope to make men better morally, more intelligent mentally, more agreeable socially, for, meeting together, we shall be better fitted in every way for the duties of home and citizenship. We shall get new ideas of how to make our homes enjoyable by adding new beauties, new comforts and new pleasures. In short, let us make these meetings so pleasant and valuable that we shall all be glad to come, and our homes so lovely that we shall be glad to return to them."

How Much Education and of What Kind Does the Horticulturist Need?

W. F. Blackman.

Mr. President, Ladies and Gentlemen:

I wish to thank your Secretary for giving me this opportunity to make the acquaintance of the members of the Florida State Horticultural Society. I can not feel that I am altogether a stranger here. From your organization until now I have been a constant and interested observer of your work. During all that period and more, though residing elsewhere and engaged principally in another occupation, I have spent some portion of nearly every year in Florida. In Lake County I have plowed and harrowed her sandy soil with my own hands; here at Miami I have grubbed her rocks and palmettoes; I have planted, transplanted, budded, sprayed and scoured, fertilized, harvested, marketed and eaten her fruits: I have seen my beloved trees killed to the ground by the cold, and raised again as from the dead; and meantime I have read with keen and increasing interest all the discussions on which I could lay my hands, whether in your volumes of proceedings or in the newspapers, which members of this body and others have devoted to the subjects with which we are here concerned. It is a sincere pleasure to look into the faces of men whose names have been so long familiar to me, and to whom I am indebted for so many valuable suggestions.

Obviously I cannot undertake, in the twenty minutes allotted to me, to discuss with any thoroughness the subject of education—a hint or two must suffice.

In general, let me remind you that there are two very distinct sorts of education. The one may be termed "practical"; its aim is to train the youth for some specific occupation. The education of the clergyman in theology, of the physician in medicine, of the lawyer in jurisprudence, of the engineer in physics, mechanics and the like, are illustrations of what I mean. Here the idea of general culture is wholly subordinate—knowledge, dexterity, efficiency in a particular and limited field of action is what is aimed at. This is the education given in the professional school, the school of technology, the manual training school.

The other sort of education is what we call "liberal;" it is synonymous with "culture." Here, the principal aim is to develop, not the mechanic, the merchant, the doctor, the dentist, but the man himself—the whole man—so as to make him the strongest, broadest, finest, most symmetrical, happiest and most useful person possible. The effort is to evoke and develop all his latent capacities; to give vigor, endurance and suppleness to his body; to strengthen and enrich his memory; to liberate and chasten and fructify his imagination; to fortify and rectify his will; to refine his taste and given him dignity and delicacy of manners, and, as tend-

ing to all this, to make him familiar with the best that has been said and done in the world. This is the sort of education which is sought to be imparted in the college of older fashion.

The Pratical Education.

Now, the partisans of the practical education are apt to rail at the other kind as being useless, wasteful of time, "hifalutin"—as tending to turn out mere dramers, dawdlers, dillettantes, dudes, The partisans of liberal education, on the other hand, are apt to speak contemptuously of practical training in schools. In the first place, say they, it does poorly that which it tries to do; the best place in which to learn engineering or carpentry is the shop; agriculture, the farm; horticulture, the orchard; doctoring, the hospital; law, the attorney's office and the court room. The school can give only a smattering of these subjects at best. Moreover, all this training, even if it were effective, is not education in any real deep sense. It tends rather to narrow the man than to broaden him; it furnishes him with no quickening ideals at all; it imparts no penetration, power, self-control, fructification to the intellect; no steadiness to the judgment; no precious store of glorious and imperishable truths and examples to the memory; no refinement to the taste; no gentleness and winsomeness to the manners; no persuasiveness and cogency to tongue and pen. Training it is, but education it is not, and should not be so called.

And, now, is it not obvious that each of these opposing views contains an element of truth, and that each needs the other to correct and complete it? The true principle of education has sometimes been stated in this phrase: "A man should be taught something of everything, everything of something." That is, he should have a bowing acquaintance with every science and art and occupation; this will make a man of him. He should have an intimacy as of "bed and board" with the particular subjects for which he has special aptitude, and which underlie the vocation which he is to follow; this will make the mechanic of him, or the minister. Man and mechanic or minister, both in one, is what he ought to be.

Applying this principle in the field of horticulture, I should say that if I had a boy, my own or yours entrusted to my care as an educator, who was probably destined to be a horticulturist—and I do not know any happier or more useful destiny on the whole—I should encourage him to study along three lines.

First, a Scientist.

First, he ought to be made, at least in some primary sense, a scientist, by which I mean, in the first place, that he needs to have developed in him that attitude and temper of mind and those fundamental, all-embracing and all-determining concepts which belong to modern science. You know what kind and method of mind the study of science tends to beget. There belongs to a certain simplicity and candor like that of a child, a reverence for the Fact, freedom from prejudice and orthodox tradition, utter fearlessness and accuracy, steadiness, patience and thoroughness of research, accompanied by constant criticisims of results attained. Another mark of the scientific mind is its belief, serene and unshaken, in the relation of cause and effect; that in the whole universe is no accident, no chance, no supernatural which is not also in a profound sense natural. Here are phenomena,

doubtless they have a cause; this cause is ascertainable; it is my business to ascertain it, and ascertain it I will. Hence the scientist confides in and employs the inductive method; he does not jump at conclusions, does not guess, but seeks to accumulate the greatest possible number of instances, scrutinizes and analyzes and classifies these, eliminates the irrevelant, the merely casual, and then derives from them those great and invariable and trustworthy laws which they embody, and by which his action must be guided. How needful and how admirable is this kind of mind, when applied to the intricate problems of horticulture, the forthcoming sessions of this Society are sure to show as meetings of previous years have shown.

Moreover, in the second place, the student should be made familiar with the fundamental principles of two particular sciences, chemistry and biology, as well as of those other two into which biology bifurcates, namely, botany and zoology. Chemistry will teach him what are the forms and the forces of the inorganic world upon which he is to operate and which it is his business to transmute into lovely, nutritious, delicious, forms for the sustenance and delight of man. Two subjects and their inter-relations—soils and fertilizers—it will not do for the horticulturist to deal with blindly or by hap-hazzard experiment; he must know how to determine accurately their properties, their possibilities, their values, their proper management, and this is what chemistry will teach him. And biology will show him what are the forms, the properties, the functions, and the origins of living organisms; how these stand related to the inorganic world out of which they spring, how they reproduce themselves, and what are the conditions of their growth and health, and the causes of their disease, decay and death. And how much it will add, alike to the efficiency and the joy of his work, if botany and zoology have familiarized him with the classification and specific characters and life histories of the plants among which and upon which he expends his labor, and of their friends and foes of the animal world. To be sure a man can drive a mule and handle a hoe without knowledge such as this, but how blind are his eyes, and how helpless he is among the great and intricate forces of nature with which he in part co-operates and in part struggles!

Second, a Business Man.

In the second place, I should wish the boy to be trained in the spirit and methods of modern business. The modern business man, like the modern scientist, has a certain temper of mind peculiar to himself. It is not merely that he wants to "make money"—others share that wish. Before all things else, perhaps, he is an organizer; every element and detail of his business is co-ordinated; every man and every minute has a specific task; there are no criss-cross purposes, no waste of energy or of time, no waiting of one for another, no useless remnants. And this thorough organization of business is accompanied by a precise system of accounts. Every element of the cost both of the production and distribution of goods and every item of income are set down; there is no guess work, no "rule of thumb," no lumping off and averaging up, no slipping and sliding along year after year. And consequent upon this method of book-keeping there have followed for

almost every form of business a multitude of small economies which have made the difference between failure and success.

It is notorious that the business of tilling the soil has not yet been reduced, except in isolated instances, to any such thorough organization and system of accounting as have manufacturing, merchandising and fiscal undertakings. The question so often discussed, whether farming pays or can be made to pay, will not receive any adequate answer until each variety of soil planted—hammock, pine-land, prairie, each particular field or separate fraction of a field, each variety of fruit or ground cultivated, each brand of fertilizer used, each make of implements purchased, each method of marketing employed, each selling agent patronized, each animal used, whether for draft purposes or otherwise—horses, mules, oxen, cattle, sheep, swine—not until to each of these, so far as possible shall be assigned a separate page in the account book. I would therefore put the boy who is presumably destined to be a horticulturist through such a drill as we provide in Rollins College, and is provided in many other similar schools, in commercial arithmetic and commercial law, in bookkeeping, in the principles of banking and in the methods of the counting-house.

Third, the Liberal Studies.

And in the third place I would have the boy who is destined for horticultural pursuits gain as much education in liberal studies as his father can pay for and the boy himself can assimilate. I do not, indeed, believe in pulling, coaxing, goading dolts, whether rural or urban, through courses of study which they detest—in thrusting bitter pills of learning in heroic doses down unwilling throats. But I do believe in culture, and I believe that culture is as good for the tiller of the soil as for the resident of the city. After all, what is the use of teaching the boy how to make a living, if his life itself is not going to be worth while? How many sweet oranges there are, grown by thorny, sour-orange souls! We want, the world wants, God wants, kid-glove men quite as certainly as kid-glove fruit. Yet there are fathers in Florida who are taking infinite pains to turn out the finest possible package of fruit, thin-skinned and high-flavored, while growing sons and daughters whose skin is thick and whose flavors are dull and stale—four-dollar oranges, ten-cent men!

But is there anything on earth so wonderful and so worthy of culture as a human soul? There is reason, by which we set in array premises, draw trustworthy conclusions, forecast the future. There is memory, by which we retrace the steps we have come, annihilate time, make the dead past to live again and forever. There is imagination by which, without stirring from our chair, we traverse hill and dale, river and sea, as though we were unbodied, annihilate space, go to and fro through the centuries, making fellow-citizens and friends of Paul and Plato; construct ideals and bask in "the light that never was on sea or land." There is feeling, the capacity of joy and sorrow, of love and hatred—a harp with a thousand thrilling chords. There is the will, that regal power within us that co-ordinates and compels all the others. Oh, what is there else so marvelous as a soul? Others will plead the cause of the orange, the peach, the

berry; I plead the cause of the soul, of your sons and daughters, and I plead for those studies by which the powers, the values, the beauties of the human soul, are aroused and evoked and developed to their highest. And I know that this plea will not fall on deaf ears, in a gathering of horticulturists; for embedded in the term "horticulture" is the fine word "culture." The mere fruit-grower may be dull of mind, slovenly in method, the slave of ancient and inherited habitude, utterly careless of the scientific and æsthetic aspects of his vocation, and satisfied with a poor product if so be it brings him his daily loaf. But the true horticulturist is not so; the very word gives us hint of the intelligence, the alertness, the devotion to science, the enthusiastic search after improved methods, which mark the man himself, and also of those gains, slow but precious, by which the labors of consecutive generations of true horticulturists have been rewarded and the world enriched. Culture is one thing, whether it be the culture of oranges or of hearts and minds; for culture means, in both cases, the fine instead of the rude and crude, the scientific instead of the hap-hazard; knowledge of all the best that has been, and reasonable enthusiasm for the yet better. which is to be.

Citrus Fruits in Manatee County.

Report of the Standing Committee, by A. H. Brown.

Mr. President, Ladies and Gentlemen:

Since the organization of the Florida State Horticultural Society, which took place in Ocala about fifteen years ago, (and I am proud to state that I cast my lot with the fruit growers of our great State at their second meeting at the same place, and with but few exceptions have been in attendance upon its meetings ever since) quite a large portion of the time of our annual meetings has been consumed in papers upon citrus fruits, insects, diseases, etc., with the consequent discussions.

This has been a perfectly natural condition as a large per cent of our membership has been from the ranks of those most interested in citrus fruit culture; and there is no doubt but that the entire session could be profitably filled up by discussions on this one topic, but we must not be selfish toward our brother who is engaged in the growing of peaches, pears, grapes, pineapples, strawberries, etc., and toward our other brother who is not a horticulturist in the strict sense of the term, whose energies are turned in the direction of raising celery, lettuce, cabbage, tomatoes, Irish potatoes and that long list of vegetables which our State, with its varied climate and soil is capable of raising to perfection. I repeat, our citrus discussions have been to a large per cent of our membership the feature which has drawn us to these meetings; and we anticipate them with the greatest interest and at the close feel that

we have gained something by this interchange of experiences and views.

In years past, the Committee on Citrus has not confined itself strictly to its subject; that is it has perhaps encroached upon the ground of our other standing committee, that on Insects and Diseases of Citrus.

Now, if in what I may have to say I tread on forbidden ground, I beg the pardon of the last-named committee.

Soil and Climatic Conditions.

Are not the same in all sections of the citrus belt. I was very much surprised and deceived when I moved to the Manatee river section about eight years ago, after a residence of ten years in the rolling country adjacent to Ocala in Marion County, to find that there was a large per cent of the pine lands in the Manatee section that was absolutely unsuited to the growth of the orange tree, while in Marion County we could set trees on any of our lands and with more or less fertilizer our trees would do well, barring injury from cold waves. Our most productive lands in the Manatee section are only from six to twelve feet above mean tide and our finest orange and grape-fruit groves are on such lands. Trees set in these soils do not do nearly as well when first set as in the higher, better drained soils of Marion county, but after being properly drained the soil becomes sweetened and eventually the trees do well.

I shall confine myself strictly in what I may say to conditions which exist in my locality and to propositions with which I have personally been brought in contact.

As manager of the Atwood Company's grape-fruit grove of 220 acres lying on the north band of the Manatee River, I have found the drainage feature the most important to the healthy and successful growth of our trees.

In a tract of that size there are more or less depressions, and naturally the surface drainage is toward these low places, and a system of ditches connecting these with the river makes it possible to relieve the ground of surplus water quickly after our heavy rains. In addition to this our trees are set with rows 30 feet apart and trees 15 feet apart in the row; and when places were prepared for the trees mounds were raised at least one foot above the level of the ground. Subsequent plowings have been towards the trees which practically makes every dead furrow a drainage ditch. The ground on the tree rows is now probably close to two feet above the level of the dead furrows. Under this treatment our trees with few exceptions are doing well. These exceptions are in some depressions where the soil is too sticky to admit of being plowed toward the trees and will be graded up by hand.

Diseases.

One peculiar feature of these lands is that when trees are first set, for the first year or two they are more or less subject to dieback, and in many instances I have been inclined to pull up poor dieback trees and replace them with good trees from the nursery. But from experience I have found that suddenly the tree overcomes the dieback conditions, or these conditions cease to exist, a new growth pushes out vigorous and healthy and that stump, apparently worthless, becomes a thing of beauty and a joy, perhaps not forever, but evidently proposes to repay for the worry it has given us. So I have learned that in many instances it is wisest to nurse

along the old stump for a while. In some few spots where the dieback seems to be more persistent I am using the Bordeaux mixture and from observations where this has been used I am confident the dieback can be overcome. I would use the Bordeaux only when absolutely necessary, as it kills out some of our fungous friends and makes more spraying with insecticides to keep down the scale.

Our grove is set largely with trees on lemon and grape-fruit stock, which from what I have observed, I regret very much. I would prefer on such lands as we have that all the stocks were sour; I think the sour stock would be inclined to be more dormant during the danger period in winter than the others mentioned, and also less subject to disease.

We have not up to this time had any foot-rot or gum disease on our grape-fruit grove, but on a small grove of my own on well-drained pine land I have had considerable trouble with grape-fruit and Tardiffs budded on rough lemon. I have checked it by cutting away all diseased wood and painting with carbolineum. This is also an excellent remedy where woodlice or ants have worked in the stock.

In the older sweet seedling groves in the Manatee section the blight has become a most serious trouble, and in so far as I am able to learn, the cause is not understood, neither is there a remedy at hand.

Insects.

In the Foster grove at Manatee is the point where the white fly first made its appearance on the Manatee River, I think about fifteen years ago. For a time it seemed as though they would destroy our groves, but about nine years ago, just before the freeze of '95, there had appeared an enemy to this pest. At that time it was not recognized as the white fly fungus.

The freeze came, took off the foliage of the trees and thus disposed of the fly temporarily. On its reappearance the fungus also appeared and today there are few growers who are attempting to keep the fly down by spraying. You can figure, however, that you will lose about one crop in three; also that one crop will be smutty fruit and have to be cleaned before it is salable. Many claim that after the fruit is washed it will not stand up, but will go through in bad order. I am convinced that if carefully handled and not bruised in washing and allowed to stand two days after washing before being packed, anything affected by the washing process will develop and be thrown out.

Scale in so far as my experience goes, is not troubling us to any serious extent. There seems to be sufficient proof to convince almost any one that where we use fungicides, such as sulphur and Bordeaux, we are almost sure to have a crop of scale follow; and it seems to be a safe precaution to spray with some good insecticide shortly after having used either of the above mixtures.

The purple mite I have found this season on some sour seedling nursery stock planted between our grape-fruit rows, but it does not seem to be spreading to the grove trees.

The yellow or six spotted mite has appeared in small numbers in our grove but we are using the caustic soda sulphur spray which is very effective. Last season it was so prevalent in most sections of the State as to cause the foliage to drop and to materially reduce the crop for last season. Conditions were also most fa-

vorable for the rust mite to get in its work and as a consequence most, or quite a per cent of the fruit was russet. This season so far we have had plenty of rain and in all probability this crop will be bright. We are not taking any chances, however, but are using the Jumbo Duster with the lime and sulphur mixtures to keep our fruit bright. To spray or not to spray still seems to be the question, but it looks to me as though it were necessary if we wish to raise bright attractive fruit.

I heard some complaint this spring among my neighbors that the thrips was very abundant and in some instances was causing the bloom to drop. I think I have observed the thrips more or less abundant at the time of blooming ever since I have been in the State, about eighteen years, but never have been able to measure the extent of harm, if any, for the reason that with two trees standing side by side, both full of bloom, both covered with the thrips one will set a full crop of fruit and the other will drop almost all its fruit, showing that there must have been other causes to produce these opposite results.

Grape Fruit Varieties.

As I am more interested at this time in the cultivation and growth of the grapefruit I wish to comment briefly on our experience with the different varieties. We have in our grove the following well-known varieties: Walters, Triumph, Royal, Pernambuco, Marsh's Seedless, and perhaps 1,500 trees of unknown seedlings.

In our catalogue I find the Triumph listed as a medium late variety, which is entirely contrary to my experience. It is the earliest we have and we began shipping this variety October 16, the past season, and I find that if it remains on the trees until January or February, it becomes light, and by March 15 in many instances the juice is entirely gone. This is one of the sweet varieties of pomelo, that is, it has but little of the characteristic bitter of the old seedlings. It is a most prolific bloomer and usually sets more fruit than the tree is able to hold up. Fruit is mostly on the outside on the extreme tips of branches. We are now thinning out the fruit on these trees, picking off the smaller and inferior or marked fruit.

It usually runs too small, making many 96s and 126s and some 150s. We think by thinning we can get it to run 64s and 80s to a large extent, and get just as many boxes as if not thinned and of a more desirable size.

The Walters bears most of its fruit on the inside of the tree and a broken limb is almost unknown. You never are fully aware of the amount of fruit there may be on the Walters until you come to pick it. When a full crop sets the sizes are from 46s to 64s. Our crop was much scattered the past season, and we had many 36s and some 28s of this variety.

We have a block of about 750 trees of the Pernambuco variety. The trees are fine in size and appearance and I looked for a fine bloom on these particular trees this spring, as there was but little fruit on them last season. I am disappointed, however; they act very much like a seedling, putting on fine growth, but no inclination as yet to bear much fruit.

I scarcely saw a bloom at the time other varieties were blooming. I have wondered if this was a characteristic of this variety. I don't know from what trees the budwood came, but it is barely possible that it was from non-bearing trees.

At the time of writing this I have had no correspondence with the other members of the committee, but presume they will have something more interestng to present to you.

DISCUSSION.

Mr. McClung—I would like to ask the gentleman if seedlings color as well as other varieties.

Mr. Brown—As far as the seedlings and pomeloes are concerned, they do not. Other varieties color up fully as well. The early variety colors up the first of October. Our entire crop of fruit this year did not color up as in seasons past, which we attribute to the excessive rains.

Mr. Carroll—It was our experience that a good deal of the fruit that is ordinarily well colored in February was not as well colored as usual.

Mr. Waite—I wish to ask if the members have any trouble with fruit coloring on rough lemon stock. I have had a great many Tardiffs, a good many last year, and during the entire season up to the time of our packing last fall, these same Tardiffs which were on rough lemon stock were green.

Dr. Inman—I had quite a number of Tardiffs, a large portion of which grew on rough lemon stock, and they all colored up as well as did others early in the season. I observe that while the grape-fruit is light the Tardiff is affected very little on rough lemon stock.

Mr. Butler—I have noticed that myself, slightly, especially where I had some rough lemon stock. In the spring time the fruit turned green, and I attributed it to coarseness of the rough lemon leaves and the extra growth that it takes on in the winter time. If one can stop it from growing until maturity takes place, the fruit will have more color.

Mr. Stewart—I had some Tardiff trees and among them were some very big trees the fruit of which was always green and rough and never fit to ship. I did not know what was the matter, but after the freeze came and froze the trees to the ground, they came up and showed the stock to be rough lemon. I have generally had a nice crop of fruit; the rest were all very prolific.

Mr. Blackman—In this locality the only stock that is used for budding is rough lemon and there is no difficulty. I don't think I ever saw a place where oranges color more beautifully than here on that same class of stock. There may be some difference in the soil or other conditions that cause the lemon to operate differently in different localities, but here it is this stock that we bud on.

Mr. Street—So far as I know, the rough lemon is not so much used on the east coast, nor in Volusia county, but I tried some rough lemon stock to bud the navel on, thinking it would bear better. It is a shy bearer with us. By accident the Tardiff was put on it too, and they bore the same way. They are late in coloring and late in coming to maturity—later than others.

Mr. Waite—I will say this in connection with the Tardiff, while the coloring in the fall is green, the fruit on the rough lemon in March is much sweeter than that on the sour stock, and at the same time well colored.

Mr. Harrington—I think it s a peculiarity of the Tardiff that it never fully colors on any stock. It is a great fruit with us in Winter Haven, and at least half of our oranges in that section are Tardiffs.

The tendency is to increase that variety. My observation is that it does not color as well as other varieties, but is likely to be a little green about the stem.

Mr. Pettigrew—A worthy citizen of Braidentown (now deceased) had an idea that the rough lemon stocks caused the fruit to be poor and coarse. One day while he was showing his trees to me and pointing out where the trees were on sour orange stocks and produced good fruit, I found on some of them lemon sprouts from the roots and also where he had planted trees on lemon roots and got poor fruit. I showed him sour orange sprouts. His stocks were mixed, but on good land. They all produced good fruit, while on the bad land any of them produced poor fruit.

The poor land here spoken of was "seepy," and so wet that only by ditching every tree could they be made to live and grow. Only a few, not more than ten or twelve, trees were on this sort of land, and the fruit was watery, weak and lacking in flavor, regardless of stock or varieties. None of the trees were over eight years old. Later I sold many trees to the party above mentioned and he always called for them on lemon roots.

Mr. Harris—I would like to hear the experience of those who have the Boone's Early, as to its holding on to the trees, why it drops badly, and why it is inclined to have brown spots, such as have been complained of this year also in California.

Mr. Pettigrew—In 1901 and 1902, with me it was the earliest fruit. My trees were on hammock land, and the fruit was of a very good color, and it was a very good orange in every way. I had none of those spots; at least I have not identified any. They were the very earliest orange I had.

Mr. Hart—The Boone's Early orange colors up early in the season and is a very satisfactory fruit if picked and shipped as soon as it becomes fairly yellow. But my experience is that it then begins to drop badly and much goes to waste from falling, and from spotting of the fruit on the tree, if left longer. The tree is an early and prolific bearer and seems to be healthy, though the foliage has a diseased appearance and there are discolorations that look like dieback streaks on the growth up to the size of one's finger.

The tree is almost thornless and the fruit has few seeds.

President Adams considered the Parson Brown the best early orange. It is in good eating condition while yet green as grass and should be colored up after picking if sent to market. This may be done by the Northern receiver.

This variety hangs well on the tree and is a fine, sweet orange even as late as March, though not as sprightly in flavor as mid-season varieties at that late date. The tree is a strong upright grower with many large thorns. While young it is not apt to bear heavy crops of fruit, as it is giving its energies to growth of wood.

I have some of Prof. Webber's hybrid of Parson Brown and Tangerine combination budded from seedlings a few inches high, April 22, 1899, that are now fifteen and sixteen feet high with spread of fifteen and seventeen feet, and carrying quite fair crops of fruit that show most of the characteristics of the Tangerine but are larger in size. I was a year ahead of any one else in fruiting these Webber hybrids, so this is the third year of bearing for some of them.

Mr. Munson—I should like to ask Mr. Brown as to the distance apart he plants his trees on hammock land, that is, his orange grove.

Mr. Brown—Our grove is six years old. In some places the trees are beginning to meet. They are fifteen feet apart in the row, and the rows are thirty feet apart. We have given them plenty of room in one direction, and I don't care how fast they close up, as in that way they protect each other from cold.

Mr. Reasoner—I think it would be a good plan when setting trees in rows to place them so that the rows with the wide distance will run east and west, so that every tree will have a maximum of the sunshine.

Member—Ours are placed north and south.

Mr. Reasoner—If the thirty-foot distance is east and west, when the trees are large they will shade each other; otherwise they will not so much.

Mr. Butler—There is one question I have been hoping you would mention. Most of us have a sufficiency of bloom as a rule this spring, but most of us do not have sufficient oranges when they get done dropping off. I know some who have not ten per cent of a crop left. I know one grove which dropped very heavily, leaving a slim crop, while some groves have a good crop. Others dropped three-fourths of what they had. Again, some trees drop the lower crop, but have a good top crop. If there is any reason why oranges drop this year, I am sure I should like to know it.

Mr. Street—I should like to know if anyone has had experience with trifoliata stock in central Florida.

Mr. Hart—I will say that my experience with the orange on the trifoliata stock is rather a small one. It has not been tried largely in our section by any one, but where tried all the trees were killed by the cold at the time of the 1894 freeze. I know that all along the northern counties it seems to be a good stock. The trees will stand a severe spell of cold, but down at Hawks Park, which is 127 miles south of Jacksonville, it has proven too tender.

Mr. Sampson—It has been proven that the trifoliata will stand more cold than other oranges. They start a new growth about a week or ten days later than on the other stocks. The results with me have been good. It makes an early bearing orange, earlier than other stock.

Mr. Reasoner—I must say that on the Manatee River I find it must have a fine-grain soil. Where it is planted on light land or coarse sand, it is a very slow-growing tree, and not at all desirable. I should not think it would do on the east coast at all. It must have a fine-grain land.

Mr. McClung—I will say that my orange trees have suffered from some cause this spring. The foliage is not in a normal condition, and the fruit is not healthy, though the trees look fairly well. The fruit has not dropped but the foliage drops off. Is your Tangerine foliage in a normal conditon?

Mr. Butler—So far as I know, it is.

Mango Culture.

By A. A. Boggs.

The day has come when the subject of tropical fruit culture in Florida is no longer of merely academic interest. The developments of the past two years have added at least two to the long list of fruits, the culture of which in this State may be undertaken as a sound business venture. These two are the mango and the avocado. We have, of course, much to learn as to the best methods to be followed with these fruits, but enough has been done to prove that they can be successfully and very profitably grown throughout a considerable extent of territory in extreme south Florida.

The mango is a fruit of Asiatic origin, which came to Florida by way of the West Indies, where it now grows in profusion, both wild and in cultivation. There is no fruit which differs more sharply in varietal characteristics than the mango. There is as much difference in flavor between the poorest of the West Indian types and the tender and luscious Mulgoba as between a Spitzenburg and crabapple. And yet in the chaotic system of propagation of seed hitherto in vogue in Florida and the Islands, there was no fixed line of demarcation. All kinds were sold as mangoes, and the fruit consequently was judged by its worst samples. As long as these conditions prevailed it was folly to think of making a place for it in the market, ripening as it does when the peach season is on.

But there is some reason to believe that

A New Era.

has begun. As announced in a paper published in last year's proceedings of this Society, it has been discovered contrary to the old beliefs and authorities, that the mango may be propagated by "patch" budding. The work of the past year confirms this conclusion. The mango is not as easy to bud as the apple or the orange, but under favoring conditions it is probably easier to propagate than the pecan. It may be done at any time when the stock is in thrifty growth, so that the bark separates readily. The best size of stock is from an inch to one and a half inches in diameter; but smaller stocks will take, and large bearing trees have been successfully converted by budding in the branches. The bud-wood should be as mature as possible. An Australian writer advises wood three to seven years old, but one to two year-old wood has given good results here. Great pains should be taken to secure a close fit all around, and the wrapping should be just firm enough to bring the surfaces together, but not to produce great pressure.

The difficulty of transplanting the mango has been much exaggerated. It is hard to reset volunteer plants leading a half-starved existence in the shade of larger trees, but a one or two-year-old seedling grown under nursery conditions may be transplanted almost as easily as an orange tree.

The Mango is Hardy.

It is almost impossible to kill a seedling by neglect, starvation, drought or fire. I have not seen any of these tests applied to budded trees, but no plant responds better to judicious care. I have seen my trees go through two freezes with no more damage than the singeing of a few inches of new growth.

In soils the mango prefers the high and dry. It seems to demand less fertilizer than any other fruit tree on pine land, and that with a relatively small percentage of nitrogen. For cultivating my bearing trees I depend entirely on the spading harrow, first mowing the weeds in the fall and then keeping them down with the harrow till spring.

Like all other useful plants the mango has its enemies. Chief among these in our region I rank a fungus which has been worked out by Prof. Rolfs. It attacks the leaves, more particularly in young plants, and sometimes with fatal results. It yields to treatment with Bordeaux mixture. There are a number of insects which attack the foliage of the mango, but I have never found spraying necessary for them, or seen any very serious damage done by them. It has no scale parasites, so far as I know.

I consider the introduction and propagation of the best varieties the most important matter for study by the mango grower. In order to make its way in the market it must compete with the peach and to beat the peach it must be good. There are plenty of mangoes of fine flavor in Dade county, but most of them are too fibrous to be eaten out of hand without getting in a mess. So far as I know there is only one variety now established by actual test in Florida as combining the qualities of flavor, texture and appearance necessary to win its way in the market.

Varieties.

That is Mulgoba. The Department of Agriculture and several private individuals as well, have succeeded in importing a number of the best East Indian varieties; among them the famous Alphonse; but as these plants have not yet fruited here, we cannot speak of them with certainty. Specimens of a variety said to have been propagated from seeds brought from the Philippines have been sold on the Miami market. These had a very fine flavor and a good texture, but were ugly in shape and color. Their market value is very doubtful. Several of our Florida seedlings are very good, but I should have no hesitation in advising the prospective planter to stick to the Mulgoba in preference to anything now available.

The proper distance apart for planting mangoes is hard to determine. There are two distinct types of seedlings, one having a far narrower top than the other. And we have no trees which have stopped growing yet. I shall, in future, set mine about thirty-five feet each way. There are individual trees in this county now which must have a spread of forty feet, and are still growing fast. It is to be expected, however, that the budded trees will be smaller.

Remarks by Henry M. Flagler.

The President—I would ask Mr. Henry M. Flagler, who is in the rear of the audience, to come forward and give us a few words.

Mr. Flagler was introduced by the President, and said:

Mr. President, Ladies and Gentlemen:

There have been a few times in my life when I have regretted, and never more than I regret today, the fact that speech-making is no part of my outfit. To say to you that I am glad, pleased to see so many of you here, does not convey at all the feeling in my mind. I was here a moment before you adjourned for dinner, or after adjournment, and I said to some of you what I want to repeat; that since I have worked in Florida, I have never realized or felt the pleasure that being here today has afforded, because I realize now how much enterprise has followed me if I may use the word without being egotistical. I will say that it is not necessary to travel 367 miles of Florida railroad to discover a work of merit; but the man who cultivates his five acres or ten acres industriously and soberly, that man has his reward. It is not the size of the thing we do, but the way in which we do it.

There are some other things that I am conscious of. One is that some men never know when to stop, and I fear that I am one of that kind. It is so hard for many persons to get out of a rut. I will tell you a story of an Irishman who was brought before a local magistrate for a petty offense. The poor fellow stammered terribly. I shall hardly undertake to repeat it. It was something like this—Phz-phz-zip! The magistrate got tired, and, turning to the constable, said: "What is this man charged with?" The constable said: "I do not know, except soda water." I am not charged with soda water but wish to say I am very greatly pleased to meet the fine body of horticulturists that are here assembled.

Ornamentals for Florida.

By W. J. Ellsworth, of the Committee.

In the practice of ornamental horticulture in Florida we have a field remarkable for the diversity of its conditions of climate and soil as well as in the character of its flora. These conditions at times prove somewhat confusing to the would-be planter who is at a loss to know what to plant or how to plant it; and as it is

now two years since this committee has made a report we have thought it well to suggest certain varieties and classes of plants of easy growth and satisfactory in results.

In view of the danger of occasional severe cold spells, we will omit from our list all varieties not strictly hardy, or in the case of shrubs and small plants, such as, in the event of being injured by cold, do not possess sufficient recuperative ability to put forth in spring and give good results the following season.

In bulbous-rooted plants we would mention the crinum family, specially desirable, succeeding in almost all situations, no soil being too light to admit of vigorous growth and free blooming. Several varieties of this family are known under the name of "Milk and Wine Lily." Two specially admirable sorts are crinum augustum and pedunculatum, the bulbs of which attain large size and produce immense numbers of flowers. These plants generally lose their foliage in winter but the bulbs put forth vigorously in spring and bloom as profusely as though cold were never heard of.

The canna family is very desirable for planting where good soil and a reasonable amount of moisture are available. Under such conditions cannas are of easy culture and most of the sorts extremely floriferous, blooming almost continuously from early spring until frost. This family has improved much in the hands of the hybridizer, and in the gigantic flowers—five to six inches in diameter—to be had nowadays no one would recognize the "Indian Shot" of a dozen years ago.

As summer growers the fancy-leaved caladiums will be found specially satisfactory if given good soil, plenty of moisture and partial shade. There are hundreds of varieties, admitting of every conceivable shade of coloring and variety of marking. The alocasias succeed under about the same conditions and afford fine effects with their gigantic leaves three to six feet in length.

The use of vines is specially commendable, affording those delicate touches of nature impossible to accomplish in any other way. Desirable and full-growing hardy vines are in abundance, such as the Malayan jessamine, yellow jessamine, bignonias, of which there are a variety of beautiful sorts, many varieties of honeysuckles, wistarias, the kudzuvine, tecomas, etc.

No list of ornamentals would be complete without mention of the rose. We will not specify varieties; all are good, and there is an immense variety of all colors and shades, climbing and standard. Most of the sorts succeed on their own roots in even very sandy soils if liberally treated. The better plan is to bud or graft on some vigorous growing stock, such as Cherokee, Manetti, Queen of the Prairie, etc. The Cherokee is probably best owing to its adaptation to almost all soils.

In shrubs and small trees there is so great a profusuion that any list must necessarily omit many desirable sorts. The following will be found satisfactory: Night-blooming jessamines, day-blooming jessamines, Chinese hibiscus in variety, allamandas, crape myrtle, durantas, myrtle, justicias, magnolias, sweet olive, oleanders, pomegranates, various sorts of vitex, or lavender tree, tecomas, pleroma, etc. The lordly palm, that earnest of an extravagant mood of Nature, must not be overlooked. From many sorts available we select the follow-

ing on account of their beauty and hardiness: Phoenix canariensis, phoenix sylvestris, palmettos, such as Sabal adansonii, Blackburniana, Sabal palmetto, etc., the needle palm (rhapidophyllum), chamærops excelsa, humilis farinosa, etc. In the cocoanut family we have cocos, alphonsii, australis bonneti, flexuosa, plumosa and others equally hardy and beautiful. Of the varieties of palms mentioned some attain a considerable height as trees, while others may be regarded as shrubs.

As is the frame to a picture, so are trees to a home, and bounteous is nature's provision for this purpose. The oak, whose praises have been sounded in song and story, abounds in great variety in many portions of the State, the gum, hickory, dog-wood, magnolia, all desirable native sorts, well adapted to almost all situations. The camphor (if a hardy sort) cherry laurel, ehretia, umbrella tree, various conifers, such as collitris, cedrus, cryptomeria, cupressus etc., are all admirable for street or lawn planting.

Viewed from a pecuniary standpoint alone the use of ornamentals about our homes and along our streets represents a profitable investment; it enhances the value of property and as indicative of a healthy public sentiment attracts newcomers to your locality.'

Diseases and Insects of the Citrus.

By E. P. Porcher, of the Committee.

Mr. Chairman, Ladies and Gentlemen:

As one of your Committee on Diseases and Insects of the Citrus, I would ask your indulgence. I have not conferred with the others on the committee and would under any circumstanees deem it best that each member make a report, thus adding to the volume of reports on these important subjects, vital subjects, I should say to our orange growers. It seems to me best that such reports should cover the actual experience of those making them, or should speak only of conditions that came to pass directly under said committeeman's observation.

In our Indian River section we have had to contend with dieback (red rust) foot rot (mal de goma) frenching, or french leaf and blight or wilt, also called limb blight. Those of us who have used high grade chemical fertilizers, almost entirely ceased cultivation and sprayed with Bordeaux mixture, have entirely conquered dieback. This matter of the use of Bordeaux mixture came up at our meeting at St. Augustine in 1901 and was pretty thoroughly discussed, pro and con at that time. Since that time I have had several letters from large growers attesting to the success of the Bordeaux mixture, when properly used.

As to foot rot, those only, as a rule, who have sweet stocks, have this trouble, and it can be generally stopped and recurrence prevented by simply removing soil from around the collar of the tree, going down until a number of the larger lateral roots are exposed. Leave this space open,

keep it open and the tree will generally be all right. I have had an experience by losing about ten fine young trees, budded on rough lemon, planted on low hammock from a form of root rot which showed no spots, sores, gum exuding or bark scaling, but the whole of the collar and root system simply softened, fermented and rotted and the tree died.

On high ground I have had no such trouble with rough lemon stocks.

Frenching or French leaf need not be classed as a serious trouble, and where it is so, I should say the soil is not one in which to grow an orange tree.

Frenching can usually be overcome by proper fertilization, by ditching or by the use of one-quarter of a pound of sulphate of iron or carbonate of iron around the trees, either finely ground and sprinkled around, or dissolved in water and applied about the tree. Care should be taken, however, as to using this on low ground where there is any question as to hard-pan being present.

With Blight or Wilt.

We have met with complete failure. This awful trouble, so distressing to us when it strikes a large, fine tree, is as completely a mystery to us today as when it was first noted by us many years ago.

Fortunately no groves are entirely destroyed by it, and in some groves there is none of it, or at most only a tree or two, but in others quite serious numbers have been stricken and we naturally are apprehensive. It is not confined to any special soil or location as to a grove or in a grove. Little or no warning is given and, when affected, we cannot discover in any way the why or wherefore.

The Department at Washington sent specialists to this State and to our section to investigate this trouble, without result; and it has been said that no vestige of damage that was specifically describable in root, branch or leaf, was found by these experts, and the whole trouble remains a mystery.

It has been stated that where a case of blight occurs the tree should at once be entirely removed and burned, as it was thought to be possible that it spreads.

This has not been at all proven, and in my own grove I have a large, fine tree showing blight that stands near other trees which are entirely free and remain free to this time. I shall let this blighted tree remain until it completely dies and watch the surrounding conditions. A strange thing about the blighted tree is that it does not die at once, but will sometimes live for several years, bearing no fruit, or worthless fruit, an unsightly object with its blue-tinged, wilted, imperfectly formed leaves, a source of worry and a mystery.

Insects.

In insects we have the red or long scale, purple scale, chaff scale, broad or turtle back scale, and the mealy bug, also a few of the red Florida scale (Aspidiotus ficus), not to be confounded with the true red scale (Mytilaspis Gloverii) called also long scale, whereas the Florida red scale is round or nearly so. In the tetranychus (spider family) we have the purple or six-spotted mite and its cousin, the red spider, which is not red at all but a pale yellow-green, and with little to denote the common idea of a spider. We have also our little pest, a little fellow, who is very big in numbers when he comes at all, the Phytoptus, the common rust mite, the little fellow who cuts down the total in number of boxes of fruit by the tens of

thousands, but who did not work such serious damage last season when we recall the fine prices obtained for russet oranges.

As to methods to be employed in fighting and controlling these insect pests which I have enumerated, I could almost say—in a personal way—use Good's caustic potash whale oil soap No. 3, and sulphur solution. Some of my neighbors, however, use resin wash with fairly good success against them. Personally, I prefer the soap spray. It is safe, as to any danger of marking fruit or hurting young foliage, and surer in its work. It is more expensive than the resin wash, but those who have used it properly are well pleased with it, and the difference in the cost, after these insects are under control, is very small.

The turtle-back scale and mealy bug amount to little, and where found just starting can be stopped off short and quickly by a spray of the above soap repeated in about ten days—eighteen pounds of soap to fifty gallons of water.

For red scale, purple scale and also Florida red scale, use the above soap at the rate of about eighteen pounds of soap to fifty gallons of water, making say four sprayings during the year. If scale is very bad at start, it will be necessary to spray oftener than this until they are gotten under control.

For purple mite I use same spray as above, and generally can eradicate them completely with two sprayings. For red spider I use sulphur solution, and if this does not do the work at once, then use fifteen pounds soap and two quarts sulphur solution to fifty gallons of water, and this seems to make an end of them. The red spider has not been in evidence with us to any great extent this season, and when it comes it is generally on the grape-fruit first and will gradually spread to the orange trees, if not sprayed and checked or destroyed. In spraying for red spider, care has to be taken to reach the under side of the leaf, and this is the spot on which these pests work; whereas the purple mite prefers the top of the leaf and will only use the under side when forced to do so by weather conditions. A great mistake has been made with the idea that rains would end the attack of these mites in particular the purple mite.

I have called several of our growers' attention to the fact that at the approach of rain these little fellows would carefully protect themselves by getting on the under side of the leaves and hang on there until the rains passed, when they would at once crawl to the top of the leaf and continue business.

For the rust mite, I would say use only the sulphur solution at the rate of one gallon of solution to fifty gallons of water, and spray every three weeks.

Strange to say, the soap spray will not stop their ravages, and if depended upon you will surely have several russet oranges. The soap and the solution can be used together, but except in the case of the red spider I would say use them separate. Chaff scale is found only on the limbs and trunks and is destroyed when spraying for the other scales.

We have no cottony cushion scale anywhere in this East Coast section.

At Daytona I have seen the white fly, and at my suggestion the soap spray was used and seemed to be having good effect. In our county, Brevard—there is, I am told, some white fly at or near Mims and LaGrange, and the county is about to appropriate $500 to fight it. I have heard of some injury to orange trees by the soldier bug, same family as the pumpkin bug,

the scientific name I do not know, attacking trees where velvet beans had been planted, the bugs feeding upon the velvet bean until it died down and then going to the trees. I have also had a report from fellow growers at Lotus on Merritt's Island as to a bug resembling the harlequin bug attacking fruit, principally tangerines, and making a hole to suck the juice and thus injuring and causing the fruit to drop; but the extent of both the injuries was not very serious, and I could not even get a sample of the last-named bug to see. In the matter of the rust mite, phytoptus, I would urge the great importance of its destruction, owing to the damage done to the trees, particularly the young trees as well as the fruit. If russet oranges fetched more than bright fruit, which is far from true when we take strictly fancy bright fruit, it would still pay us to spray and keep fruit bright and the trees free from this little insect pest. We should have a greater number of boxes of fruit per tree and per acre, when bright, and the tree would not have to feed the billions of these little insects in addition to taking care of its fruit and proper growth.

Almost all the points made in this paper have been ably presented by others at past meetings of the Society and in the public press. I claim almost nothing as original, save perhaps the use of Good's soap, and in this it is quite likely that I shall be confronted by able reports on the advisability of all spraying being dropped and a sole dependence placed upon our natural friends, who will handle for us our natural enemies.

A condition, if possible, truly to be desired and that we should all want applied to all other channels of human labor.

DISCUSSION.

Mr. Boggs—I would like to have the advice of some of the orange growers present as to the best remedy for some of the pests which we have, which I have never seen treated. I have seen as many as fifteen to twenty of these on oranges. I have seen the fruit on individual trees absolutely ruined and rendered worthless by these bugs. I never saw them go through a whole grove, but here and there they do a great deal of damage. The best remedy I have seen is to put a little water in a can with a little kerosene oil on top and knock them down into it. It seems impossible to kill them with a spray. I have tried whale oil soap, but it seems they cannot be gotten rid of. They get away and it is impossible it seems to kill them. They do not eat the leaves.

We also have trouble with the weevil. It is about one-third inch round and one-quarter inch long. They work great damage to the foliage in hammock groves. They do not affect pine land groves. We have had very serious damage done by these pests. We have used arsenate of lead, which seems to be less dangerous than Paris green. We have some trees that still show traces of it quite distinctly, but it seems to keep the insects in check.

I would like to say also that our greatest enemy has been the dieback, which has done more damage to the groves in Dade county than all the other enemies put together; but since we have been using the Bordeaux mixture I do not think there is so much suffering from dieback. We have had trees that absolutely stood still four years, had not grown three inches. A good brand of fertilizers had been used. There are many cases where this had absolutely no effect, though in some cases it did, but I have yet to see a case,

no matter how obstinate, that did not yield to Bordeaux mixture.

Dr. Inman—In regard to the cotton bug, which is quite a large bug, I have found trees in two different places that were literally covered with them. I did not know what to do, but thought I would do the worst thing I knew, so I prepared the Thrip Juice. Sprayed the trees thoroughly with it, and in a few hours the ground was covered with the dead cotton bugs. I went back a few days later and found a great many more, but in the afternoon I found that some were not yet dead. I had my man put canvas under the trees, and shake the bugs down. In that way I got rid of the cotton bug.

Mr. Carroll—A few years ago I was at Eldorado out on Lake Harris. Dr. A. A. Stivender had a grove very much affected with this same cotton bug. He made a frame, put a piece of canvas over it, 4x6 feet, letting it sag in the center where there was a hole and fastened under this a tin can with kerosense oil in it. Then by taking a mallet and padding the end of a long pole he would jar the top of the tree, knock the bugs down and sweep them into the can. In that way he annihilated them and got rid of the entire trouble. As Mr. Boggs says, he tried everything except the Thrip Juice, and it had no more effect than pouring water on a duck's back, but the kerosene oil in the can had the desired effect.

Mr. Muirhead—I am told that the easiest way is simply to throw poisoned cotton seed meal under the trees. I have not tried it, but have been told that the farmers in Georgia simply put on cotton seed meal below the trees, poisoned with Paris green; the cotton bugs eat it and it kills them at once. Paris green, as you know, is sweet and most bugs like it.

Prof. Boggs—I would like to ask some of the gentlemen of the West Coast whether they have had any trouble with the palmetto weevil, and whether it eats up the foliage on the citrus trees.

Mr. Butler—Do you mean the palmetto weevil that grows in South America?

Mr. Boggs—I am not sure, but am told it is. Prof. Rolfs can tell us.

Prof. Rolfs—The weevil that Mr. Boggs refers to is found in the Manatee region, but not enough to do any harm; therefore the people have not treated for it at all.It is not worth considering there. In some of our groves it does considerable damage and warrants thorough treatment. I have not seen it anywhere else in the State so abundant as here. I have seen it in DeFuniak Springs, Lake City and also in the Manatee sections, and doubtless it will grow in all parts of the State. The treatment Mr. Boggs gives is undoubtedly the best known at the present time.

Mr. Jones—How large does it grow?

Prof. Rolfs—The beetle could be described definitely in a few lines, but when it comes to describing one out of ten thousand there is a great deal of difficulty; but as Mr. Boggs stated, it is less than half an inch long, of a reddish-green color, inclined to be green and has a decided snout. The work of the beetle can be seen much quicker than the beetle referred to. It cuts the orange leaf, does not eat into the surface, but on the edge, probably in half a dozen different places, and by the end of the season the orange leaf is ragged. The small amount of leaf that the beetle eats is not worth considering seriously, but the beetle opens the tissue of the orange leaf and gives a chance for other enemies to affect it.

Mr. Hart—I think the beetle is rather

inclined to a gray color. I should call it gray. My experience with the beetle is rather limited. I have had only one tree that showed its marks to a serious extent. I am where I have to protect my orange trees in the winter often times from cold, and I have a supply of wood gathered for that purpose and put in piles, four-foot wood. Sometimes I cover them with palmetto leaves, three or four thicknesses, to protect them in summer. I will say that in the early part of the winter when I take these leaves off I find an enormous number of these weevils between the leaves, and do not think I exaggerate when I say I have found at least three quarts in the cover of a pile of wood not over fifteen feet long. It occurs to me that it might be possible to attract them in that way; piling up palmetto leaves that are partially decayed; then remove these and destroy the bugs. There are more here than with us, I should say, as I have seen Mr. Boggs' grove and found its mark on nearly every tree.

Mr. Pettigrew—the palmetto weevil, so called, I know nothing about, but think there is a weevil that bothers the palmetto. I saw a few on an orange leaf and they cut it a little. At one time the cotton bug destroyed most of my crop of Satsumas. I did not know what to do for them. Have been able to discover a few every year since. I have not seen any except on Satsumas.

Mr. Hart—No other subject has been touched upon that is of more importance to this State or to the orange growers, the importance of which is not generally understood, except by the sufferers—than is the blight of the orange. Mr. Waite has reported a loss of nearly eight per cent in the large groves in his charge.

Mr. Waite—That was among the old seedlings, about three thousand in number,

Mr. Hart—Eight per cent of three thousand old big seedlings. Do you realize what that means? The disease is all over this State. Prof. Webber and Prof. Swingle were sent down here to study the disease. The freeze interfered with the results of their experiments, and so far we have made very little advance. Prof. Rolfs has the work in charge and appears to be making progress, but we know he has lots of other work on his hands. The work requires especial fitness and a liberal allowance of time. I intended last year to suggest offering resolutions asking the Agricultural Department to send down specialists to study it. We have the strongest body of scientific men in the employ of the Agricultural Department that have ever gotten together, and I am sure there are those who can help us out.

It used to be that we could go into a grove of fifteen or twenty acres and the trees were nearly all alike. Now, however, a dozen gone here, four or five in another place, and the symmetry and beauty of the groves are destroyed and the market value of that grove is reduced thousands of dollars. It is a matter of great importance. The disease may appear on one limb or two and its identification be uncertain; it may show over the whole tree at once, so that there will be no question about it; but whether it is a limb or the whole tree that is affected, it ought to be taken out at once. Yet, to do this we must learn its earliest symptoms. I would like to hear from other parties concerning it, and I would ask the privilege of preparing or having prepared resolutions calling on Secretary Wilson, or, perhaps what would be better, calling on our representatives in Congress to go to Secretary Wilson and urge upon him to ask for an appropriation

for this purpose and incidentally for the study of other diseases. I believe if we make our wants known they will be given attention. I am sure that if we show to Secretary Wilson of the Agricultural Department how serious it is he would send us men who can help us, if possible; and if they cannot help us the case is simply a matter of digging up the old, big trees and setting others from the nursery in their places as fast as they show the disease.

Mr. Padgett—Mr. ———— sold part of his grove to Col. Simms, on Lake Harris. The Colonel had five or six trees that had the blight. He said he had a remedy and undertook to treat those trees. He treated them for three years and finally gave it up. Instead of digging up six trees he had to dig up sixty or seventy-five. The disease had spread to that extent in six years. It attacks the limbs and tops of the trees and goes down to the roots. If you have a limb that is affected it might be well to cut it off as near the trunk as you can. Sometimes digging the earth away and applying ball potash, about a ball of potash to two gallons of water and with a broom wash the tree thoroughly will help. Just as far as you can, take the earth away and let it stay away. Let the roots stay bare. If the limb is not injured too much by the blight or wilt, it might be left on the tree.

The gentleman here says the principal trouble he has is dieback. I do not ask that any odds. I have had that for several years and have never failed to kill it. Plow your groves and you give them dieback, you tear up the roots. Use the harrow once or twice in the spring and put potash on the trees, that will prevent dieback. Use potash and you will cure the dieback every time.

I bought a grove in DeSoto county three years ago that had had the dieback for two or three years. I have had that grove three years now and you cannot see a sign of dieback. When I took the grove the man had had it plowed with a turnplow, and when he tore up a root he would take an axe and cut it off. I told him I would have given him $200 more for the grove two weeks before he plowed it.

We have to fire down in that section for freezes. When it is cold in Lake county it is cold in DeSoto. If we use the wood in the same proportion, we can make it absolutely as safe in Lake as in the southern part of the State by firing. We are not troubled with the scale there, and the dieback does not hurt us. We are making beautiful groves in Lake and Orange counties now, and as soon as we get rid of the effects of the freeze, we shall soon be on top with the orange business.

Mr. Taylor—I would like to know if the scale will go from the peach tree to the orange tree. Orange trees are subject to the scale, and it is where they are surrounded by peach trees that they have the disease.

Prof. Rolfs—The orange tree will not be in danger of the San Jose scale. The trifoliata is the only one of the citrus trees that is affected by that scale. There is no danger of that scale getting on our citrus fruit.

While I am on the floor, will say something in regard to the orange blight. Very few of us realize what a tough proposition this is. Messrs. Swingle and Webber worked in the State three years, and then the freeze came. When I went to Mr. Webber in regard to the orange blight, he said, "Begin from the bottom." In other words, they had worked three years and had come to nothing definite in regard

to it. A great many facts that will be of value scientifically have been collected, and apparently there is some remedy for it, but up to the present time I must say we are entirely in the dark in regard to the orange blight. I am letting nothing stand in the way of work on the orange blight. When we remember that it rarely ever attacks a tree under five or six years of age, we can see that it comes from inoculation, not constitutionally.

We shall have to do some good sharp work before we get to the end yet, and all we want is the workers and the funds for the work. We hope that Mr. Hart and those who are interested in this line will push the good work forward, and see that we get the money and the workers for this line of effort.

Mr. Pettigrew—I would like to know whether anybody has proved anything as to whether resistant stock will make the tree resistant? I have never seen blight except on the sweet orange.

Prof. Rolfs—I can answer that perfectly by stating that blight occurs on nearly all classes of stock and nearly all classes and conditions of soil, and that it is not confined to the United States.

Mr. Butler—Mr. Porcher says that for rust mite he sprays every three weeks. You can kill the mite, but you cannot kill the eggs. By waiting three weeks I think the eggs would hatch again. In other words, I wish to ask whether we should spray again before the eggs are hatched to kill them, or wait?

I would like to ask Prof. Rolfs another question. How long after spraying, under ordinary conditions, would it be before you think the eggs would be hatched?

Prof. Rolfs—I don't know. I think you would find it stated in H. G. Hubbard's report, whether spraying would kill them before they lay any more eggs.

Mr. Harrington—I would ask Prof. Rolfs or Mr. Butler if there would not be sufficient of the spray material left on the trees for seven days to kill the new hatch?

Mr. Butler—I think they would hatch. I do not think the eggs would die. The last of the eggs, I would say, usually hatch and live, but have not done so with the solution.

Mr. Hart—I would like to ask Mr. Sampson if he continues to use dry sulphur on the trees for mites.

Mr. Sampson—I do. It is cheaper than the solution, but I think, Mr. Butler, the second spray should be applied in about two weeks, and then perhaps you could wait a month. I think once in two weeks better than once in three weeks. Do you find that to affect the trees?

Mr. Butler—I do not. I do think it tends to increase the fungus. I think that the application of sulphur tends to increase the scale. Thrip Juice is probably a very good thing to hold your scale down. The advantage of dry sulphur is the cheapness of the application. I do not suppose it costs one-tenth to go over the grove with dry sulphur that it does with the solution.

Dr. Inman—Should I apply the dry sulphur while the trees are dry or wet?

Mr. Sampson—The effect of the dry powder, of course, is very much better if you can apply it when the tree is wet with dew or after a rain; but in a grove of any size, if you wait for the right conditions, you will not apply often enough. I think the second application really does the work. If you do not give the second application promptly, I think you will lose by it. I should say once a fortnight is better than once in three weeks. You will

probably get the rust mite down in two applications.

Member—I would like to know if you use the sulphur powder straight?

Mr. Sampson—Mixed with lime, half and half.

Member: I would also like to ask if it destroys rust mite and the red spider?

Mr. Sampson—Yes. I think if you adopt this plan of applying dry sulphur it will not only destroy the rust mite, but if you continue up to the time of ripening of the fruit, you will find it has a tendency to color the fruit up much quicker. The man who uses dry sulphur dusting will find that his fruit will color up a week or ten days before his neighbor who does not use it.

Probable Results of Draining the Everglades.

By Prof. P. H. Rolfs, Pathologist in Charge of the United States Tropical Laboratory.

Extent.

Very few people have a definite conception of the vastness of this unexplored portion of the State of Florida—unexplored for all ordinary and practical purposes. It has never been surveyed or mapped out. That it is not an impassable region has been shown repeatedly. Colonel Ingraham and party made a trip across it and since then Lieutenant Willoughby has come over in another direction. The Seminoles know its trails so well that they can make the distance from Miami to Ft. Myers by their route in as short a time as the white man can by his route.

If we draw a line directly across from Ft. Myers to Palm Beach we travel approximately the distance of 110 miles. If another line is drawn from end of Lake Okeechobee directly south until we strike the sea, we pass over 100 miles of latitude. By approximate calculations we find this to embrace more than 1,600,000 acres. To us in the United States who are in the habit of thinking by tens of millions this does not seem like a very magnificent domain, but let us compare it with some of the much-talked-of island possessions. Jamaica, the Switzerland of the Antilles, is about 100 miles from east to west, and not more than sixty from north to south in its greatest breadth, thus embracing about 4,000 square miles. That American pearl, Porto Rico, is about 100 miles from east to west and about forty from north to south, thus giving us an area of something less than 4,000 square miles. Each of these two islands, although only slightly larger than the Everglades, supports a population approximating that of Florida.

Altitude.

The surface of the soil of the Everglades is an undulating plain, varying in height from fifteen to twenty feet above sea level to places slightly below sea level. For the most part it is above high tide, with great water ways or sloughs which serve as drainage directions.

The change of altitude is very gradual, excepting when the coral breccia reefs occur. These usually run in the same direction as the adjacent shore. These reefs form more or less of a rim of about fif-

teen feet elevation, which holds back the annual rainfall. At various places this rim has been cut through and streams of water flowing from the Everglades are called rivers. The beautiful and romantic Miami leaves the Glades over rapids or falls and six miles east empties into the Biscayne Bay. Arch Creek is another illustration. Some of the water finds its way to the ocean by underground streams. A good illsutration of this is seen at Snapper Hammock.

Character of the Soil.

While we find many varieties of soil, as a whole it is exceedingly uniform in a given locality. There are three general divisions usually recognized: 1 pine land; 2, hammock; 3, prairie. The pineland is rather uniform throughout the greater portion, the most striking variation being the long-leaf and the spruce pine. The longleaf pine occupies a considerable portion of the lands along the eastern shore and the western shore and is scattered in irregular areas and ridges at places disappearing altogether from the landscape. The spruce pine is found near the coast. While it is a very important element from the pineapple growers' standpoint, it forms no considerable percentage of the total area. The chemical analysis and physical analysis show that the spruce pine land is very different from ordinary soil used for agricultural purposes. The plant varieties on the spruce pine land are also radically different from that of any other kind of land. The hammocks are very similar to those in the northern portion of the State, varying from high hardwood hammocks to low cabbage palmetto hammocks. The total area of hammock land is exceedingly small compared to the vast area embraced in the Everglades, but it will always be an important factor in its development. They give ideal building spots and are always sought for grove sites.

The soil of the prairies is rather varied. Here we find the sand prairie, the marl prairie and muck land. The vegetation of these prairies is determined by physical agencies rather than by the constitution of the soil. The approximate proportion of these different kinds of soil varies with the localities. In some regions the sandy prairie predominates. In others the marl prairie has the greater area, while in other sections the prairies are composed of muck land. The prairie is the ideal farming land. After the heavy growth of grass has been burned off there is no clearing to be done. The vegetable grower simply sets his plow or cutaway, and at a cost of a few dollars per acre the wilderness is converted into a productive vegetable farm. This is the land that can be reclaimed with a trifling cost per acre, and when once properly drained will make an unfailing source of crop production. During the dryest weather it is only a few inches to water in the lowest portions of the prairie and nowhere more than six feet. The fact that the water table is so near the surface is a guarantee that no drought can ever be severe enough to cause serious damage under proper methods of cultivation.

Enough water will be brought to the roots of crops by capillary attraction to sustain any farm crop for an indefinite period of drought. It will simply be impossible for crops to dry up or even suffer seriously from drought if the surface of the soil be cultivated sufficiently to conserve the capillary moisture. This vast era known as the Everglades receives annually a rainfall of about sixty inches,

which means that if all the rainfall were retained upon this area during a year, water would be standing about five feet deep. The enormous amount of water finds its outlet to the sea through the various rivers which break through the coral breccia reef on the southeastern side, the sand ridges of the eastern portion and the low lying swamps on the western side.

The excessive tangle of vegetation impedes the flow of water, so that it would take a drop of water which chanced to fall in the centre of the Everglades several months to find its way to the sea. A few miles away from the river outlet the water in the Glades flows so slowly that it was impossible for us to tell by ordinary means in what direction it was flowing. When the water is carried off by means of drainage canals as is done when draining a prairie, the water flows off promptly and leaves the land dry and in an arable condition.

Drainage—Effect on Height of Water Table.

The question as to what effect the draining of the Everglades will have on the height to which water stands in the soil has been asked of scientific men who are experts on this subject. The opinion seems to be that drawing off the surface water quickly would tend to lower this level of water in the soil. In our country the land is so level that water will not run off to any great extent until the soil has become practically saturated, so the moisture that runs off is simply that amount more than enough for that time. Since a large portion of the water that falls during the rainy season would be carried off promptly by drainage it seems quite probable the water level in the soil will be somewhat lower than it is at present at the close of the rainy season. If this were not so there could be no advantage in draining. But I will show presently that the water table may sink to its lowest possible level, the height of low tide, and still be abundantly high for all crops. As I have noted before, water in the glade lands rises to within a few inches of the surface in some places and to within six feet in the dryest places. In the pinelands and hammocks it is within six feet in some places, eight feet in other places, and in some places it is as much as sixteen feet below the surface. During the extreme dry weather of last year it sank to the extreme depth of eighteen feet in some pinelands. While this seems to be a very low level for soil water in Dade county, there are portions of northern Florida where the extreme depth of thirty to forty feet is reached, and the land is still sufficiently moist to produce oranges, corn and other farm crops. Let us analyze this matter a little more closely and see what effect a change in depth of soil water has on the farm crop.

A year ago observations were made on this very point, on a certain piece of high pineland near Buena Vista, where tomatoes were planted. This crop began to give out about the second week in April. Tomatoes planted at about the same time near the Everglades on high pineland where the water stood at eight feet gave out the same time. Tomatoes planted at the same time at the Tropical Laboratory where the soil water stood at six feet, gave out at the same time. These fields are grouped together and compared because the fields were similarly treated. A crop of tomatoes grown in Reilly & McDonald's grove at Orange Ridge where the soil water stands at sixteen to eighteen feet continued to grow vigorously for

weeks after the fields cited above had failed. One would naturally suppose that tomatoes grown in a grove of vigorous orange trees would necessarily fail early. It is generally supposed that the dry weather cuts the crop off in the spring. While the dry weather is an important factor, it is by no means the only factor. While we are not yet in a position to control the matter, some very important advances have been made in this direction. From the foregoing illustrations we will see that the production of a large crop ot vegetables is in no wise dependent upon the height of water in the soil. This fact should not be confused with the droughty effect noticed on small knolls and ridges. These knolls are more exposed to desiccation and consequently do not form a parallel illustration. We find that crops on sandy ridges where it is only eight or ten feet to water produce no larger crops than sandy ridges where the water table stands at twelve to fourteen feet. In this connection it is very proper to point out to you that we have a great deal to learn yet in the matter of cultivation to produce the best conditions for nitrification and conservation of soil moisture.

Tomatoes grown in the grove referred to above produced a crop much larger than that ordinarily grown on the glade lands, yet as I have shown above the soil moisture was ten or twelve feet lower than that in the glades. This large crop of vegetables was produced bv good management in the way of fertilizers and cultivation. Ordinarily the tomato grower supposes he has done all he needs when he keeps his crop free from weeds. While cultivating a field is important to keep weeds from choking out crops, it is only an incident to the more important processes of conserving the soil moisture and bringing about the best conditions possible for nitrification. A hard-packed soil with no surface mulching allows the moisture to pass into the atmosphere. A close compact soil also interferes with nitrification, in addition to reducing the amount of oxidation of plant foods.

The foregoing shows very conclusively that even if the drainage of the glades should lower the depth of the water in our soil it will not affect the crop-producing qualities of our higher lands. I have shown you also that one of the largest, if not the largest, crop of tomatoes was grown on a field where the water table was at least six feet lower than the average and the distance to water greater than it could possibly be on the ordinary orange land after the glades shall have been drained.

Effect on Temperature.

The question as to the effect of the draining of the Everglades on the temperature of this section is an important one, and one that has been discussed to some extent. In all of these discussions the effects of trade winds and of the Gulf Stream have been overlooked, and the attention centred on the shallow sheet of water remaining in isolated places in the glades or the larger body in the Everglades proper. If we should spend a few minutes in studying the maps as prepared by Prof. Mitchell for the Weather Bureau of the Department of Agriculture, you would see very quickly that the isotherms or lines which connect places of the same temperature, pay no attention to local bodies of water. In general the isotherms follow the direction of the Gulf Stream in southern Florida. These maps show very clearly that the presence or ab-

sence of a small body of shallow water has no perceptible effect upon the climate of a place. Climate is influenced by a much more powerful and extensive factor (Illustration of Map). Dr. Millpaugh, botanist to the Field Columbian Museum, Chicago, has been making extensive investigations in the Antillean flora and finds that the portion of Florida south of Palm Beach belongs to the Antillean flora. The northern boundary line crosses the Everglades in a somewhat southwesterly direction, following the general direction of the isotherms marked out by Prof. Mitchell and referred to above. The line of the Antillean flora then passes west to a portion of Yucatan, around to above Trinidad including Porto Rico, Cuba, Bahamas and smaller West India islands.

Just as the Gulf Stream greatly modifies the climate of western Europe, so also does it modify the climate of southern Florida. In this section of Florida we find the gumbo limbo, the stopple wood, the mastic plum and other Antillean trees. These conditions of climate which place southern Florida in the Antillean flora, are much more deep-seated than the shallow basin holding a variable amount of fresh water.

When these glade lands shall have been converted into one vast cultivated field with plants giving out tons and tons of warm vapor there will be a much better protection against frost than by a small body of water in the glades which chances to be a mile or two away. At the present time, vegetation of the glades during the winter in the natural condition is practically all dead so that the warming influence of the water of the Everglades is not equal to what it would be if the large area was planted out in vigorous growing crops.

The amount of water exhaled by growing plants varies with the particular species and the peculiar conditions under which it is growing. As a general proposition, the amount of water exhaled by broad-leaved plants reaches to within one-third as much for the same area as is evaporated from standing water. When we remember that the area of leaf surface of a cultivated plant often amounts to many times the area allotted to it in the field, we see that a field set out to a cultivated crop will exhale as much and often more moisture into the atmosphere than would the same field if covered with water. As much of it is covered with various grasses and other vegetation which is practically dead in winter time the amount of evaporation from the surface of the water of the Everglades is greatly reduced and consequently the warming effect of its waters is correspondingly reduced.

Addition to Population.

Draining the glades will bring in people and money from all parts of America and Europe. The tidings of the new Eldorado will be heralded to the ends of the earth. Means and men will come in to take part in the great development. In the earlier part of my address I have shown that the Everglades approximate Porto Rico or Jamaica in size. We have a great advantage over both islands in that the entire area is habitable; there is no waste land stacked up in the form of mountains. No mountains to cut off the genial trade winds laden with invigorating ozone and cooling moisture.

Take Jamaica as an illustration. Kingston on the south side of the island has about forty inches of rainfall annually, with a dry spell of nearly six months' duration. Port Antonio, only thirty miles

away on the north side of the island, has a rainfall of 183 inches annually and an average of 200 rainy days in a year. Between the two cities are mountains that cut off the passage of clouds from one side to the other; so that in the distance of thirty miles we have all sorts of climate from dry to extremely wet, and with no certainty as to what climate excepting at the extreme points. In the mountain district there is no certainty as to the condition of the weather or the amount of rain that may be expected. On the other hand, in our glades there is no uncertainty about the water supply, and with great drainage canals to carry off the superfluous moisture and the smaller side canals to dry the land, the terrors of floods will be a thing of the past, and all subtropical plants, sugar cane, oranges, mangoes, avocadoes, sapadilloes, sugar apples, cocoanuts, will be produced in profusion, and everybody living in the area will grow all they are able to consume and all they are able to haul to the market.

Report on Pineapples.

By C. T. McCarty, of the Committee.

I have tried to induce Brother Butler to come up and take possession of the platform with me and share the responsibility of this report. Perhaps he will do so later.

What I have to say on this subject is entirely off-hand. I have prepared nothing, have not considered it necessary to prepare anything. Some four weeks ago I wrote the other members of this committee, Mr. Butler and Mr. Thornton, to cover the subject from their sections. I had a reply from Mr. Butler, but none from Mr. Thornton. Now, to go into the details of pineapple culture would be entirely foreign to this report. For the present, we will only make a few general statements, and if a discussion arises later, we will take a hand in it. I think that is always better to have, the initiative taken by the house, as it gives us an opportunity to discuss these things for which members may be seeking. I will say in a general way that, so far as the East Coast is concerned, there has been a very wide expansion in the last few years. Last year every plant was planted that could be secured. The Keys were scoured, also the Bahamas, and inquiries were made in Cuba for plants, and perhaps hundreds of acres remained unplanted for the lack of plants. This was owing to the long continued drought. This spring the outlook for plants is more hopeful. However, the demand today for Red Spanish pineapples is greater than the supply. Personally I have inquiries from Mexico, Cuba, and Texas, and from one company who desire to buy one million Red Spanish pineapple plants in California. This would indicate to you about the present

status of the industry, so far as my observation goes on the East Coast.

The novelty of pineapple culture has disappeared. So has the desire to have so many varieties as appear in the catalogues. The fancy pineapple is no more thought of among practical growers. The demand for the Red Spanish has outgrown all other demands.

Now, I need not enter into any argument why that is so; the fact that the Red Spanish is healthy, prolific in plant, in fruit, a good carrier, a good seller in the markets of the country, is a good explanation. That has been a very gratifying fact with us on the East Coast. This year bids fair to be the banner season of all our experience. We probably have in upper Dade and lower Brevard counties about 2,500 acres in pineapples, and ship in the neighborhood of 1,000 carloads.

I have very little to report in the way of diseases; I think there is practically nothing to report. The little trouble with the spider and the mealy bug is so thoroughly understood now, there is practically nothing to say in regard to that.

I believe we clearly understand the land on which pineapples should be planted, the latitude and cultural methods; but there are some investigations along the line of fertilizers that will still be of interest to us, and when reported officially will be of interest to the pineapple growers of the whole State, and those who read along these lines.

I regret that Prof. Miller is not present to make his report. I expected him to do so in connection with the report I am making. The joint experiments of Hume and Miller now in progress bid fair to give valuable results.

Now, as I said in the outset, I believe if there is anything wanted along the pineapple line, the better way would be to ask questions or in some way take the initiative along the road we shall travel. And in this, I yield to my fellow committeeman, Mr. Butler, who may have some observations to make, after which we would be glad to hear from the audience.

Mr. Butler—In early childhood, I remember a small boy who hanged a cat and then said: "I didn't hang the cat myself; my mother made me." I do not come here to make this small report myself, the committee made me.

At present there is little to add to our reports. The present conditions of our market on the West Coast are something like yours. I am sorry to say we are not planting as much as in previous years, and for at least two reasons: First, we are a little bit afraid of Cuba. Second, in replanting our old pinery, they have not done so well. I would not put out another pinery on low ground—I mean very low ground. I think that the only ground on which you can plant successfully is high ground.

In regard to the blight I am very sorry to say we have learned nothing new. It is still a mystery. I find that some of the plants are looking bad but in spite of this trouble we are getting fair prices for pines. I do not see but that the business pays fairly well. During the past winter the average price per crate so far as I know was $2.50 f. o. b. with us. Last summer with me it lacked just two cents of being $2.00, but it is fairly profitable business, although not as profitable as it used to be.

Dr. Kerr—I want to ask these gentlemen who raise pineapples if it pays. That is what we all want to know—that is everything.

Mr. McCarty—Dr. Kerr, the gauntlet

you throw down I cheerfully take up. On the east coast of Florida it does pay. I can speak for no other place, but personally it has paid me well. When I say to you that from a field of about fourteen or fifteen acres I netted last year six thousand five hundred and some odd dollars, I tell you the whole story. This is only one of my fields. I have others. When I tell you how my neighbors have made $350.00 to $600.00 per acre for several years, you can judge whether or not it pays. I cannot answer for the other sections of the state. I know that growing pineapples under shed is a very expensive transaction. We grow ours entirely in the open.

The production of pineapples, as with all other fruits, is an economic question. If expensive sheds and warming appliances are really needed in any given locality it makes a heavy handicap on the business and unless there is some counterbalancing advantage the shedded fruit is at an economic disadvantage. This whole question of shedding is in a chaotic state and sound conclusions cannot yet be reached.

Mr. Carroll—I want to answer the doctor by giving a few figures. I do not hesitate to give you the name. Mr. R——, a railroad man, bought a few acres of land, but being a section boss on the railroad, was unable to give it attention. He charged it up (it was with money he had earned out of the railroad as section boss) bought his slips and set them out, charged up each and every item. Last May, one year ago this month, he sold the crop without touching it, just as it stood, for $1,000. When he settled up, his books showed he had charged $832.60. He was offered $300.00 for the slips; so there is $1,300 he could have had in two years in cash, for an expenditure of $832.60. I saw this myself and know these things to be a fact. I will say that the price of land was included in that deal. The man who bought for $1,000 got a little over $1,400 in cash.

Mr. Carroll—Now, then, a neighbor to Mr. McCarty, Mr. Pomroy, came to your county there a young man with nothing. He bought a piece of land, put out pineapples, I think about three acres. He has paid for his land, paid for his supplies, paid for his house and everything, and has a nice home, made from pineapples inside of five years. Pineapples will pay if managed right.

Mr. Butler—I could give you a few figures that would a little surprise you, but I think that during last year perhaps one out of two or three have not paid at all. But this year is better; it is a fair year. I think they will continue to pay, unless the Cubans interfere too much.

Dr. Kerr—I wish to say by way of explanation to the audience that some parties asked me whether the pineapple industry paid or not. They were thinking of going into it and I take this way of finding out. I wish every one to understand that I have every confidence in the word of the gentlemen who have spoken on the pineapple question this evening, but when persons who have limited means are contemplating going into this business, it is necessary for them to be careful what they do lest they come out like some of us who invested in orange groves and paid large prices for them and find that we are left without much of a grove. I believe the pineapple does pay and will pay under certain conditions. If the Cuban industry does not interfere and frost come in and sit down upon us suddenly, I believe things will go on smoothly.

Mrs. McCarty—Mr. President, Mrs.

John Miller of Eden, wants to say something in reply to Dr. Kerr.

Mrs. Miller—Dr. Kerr asked the question, "Does pineapple culture pay?" It brought to my mind a young man now living along the east coast who came into our section of the county, and I am safe to say he did not have a dollar. He rented about four acres of land from a gentleman in Eden. He had the use of the land for two years; that is, he had the crop for two years after which time it passed into the hands of the original owner. That young man now, from the proceeds of his pineapples, has the beginning of an orange grove near White City, five acres of land planted in pineapples, in fine condition, worth I do not know how much, but in excellent condition, and I should say he is worth about five or six thousand dollars; and as I said before, when he came to the river he did not have a dollar.

Fancy Pineapples in Orange County.

By C. B. Thornton, of the Committee.

The past year has been a much more profitable one in the culture of Smooth Cayenne pineapples than was 1901.

The new conditions, brought about by the decreased demand for new plants has caused a change in the manner of culture and fertilizing, makes better keeping fruit and at very much less expense.

Formerly 8,500 plants were set to the acre of our regular, slatted, covered pinery; they were grown by the use of an excess of high-priced ammonia, and after first fruiting, the demand for plants caused the beds to be run as a nursery or as plant producers, as at this time that was very profitable. This so exhausted the parent plant or stool that any second crop of fruit was apt to be small and inferior.

The beds would then be dug up and reset with new plants, and it took eighteen months before more fruit could be raised. This method made the Smooth Cayenne pine an uncertain quantity in the trade; and many well-informed people from cities of 100,000 at that time have been in our pineries and said, on seeing the fruit growing, that they had no idea any such-sized pineapples were ever grown in the State, as they had never seen them in their markets.

Now, however, we do the thing very differently. We put 10,000 plants to the acre; after first fruiting, which in eighteen months will give 9,500 fruits at least, one to two plants are allowed to grow from the old plant, rattoons and extra suckers being kept off; then within one year this acre will give from 10,000 to 15,000 fruits. As in the first fruiting the larger part, about two-thirds, will come in July and August, the balance, about one-third, during the fall and winter.

Our fertilizers now contain more potash and phosphoric acid, our fruit has had but very little, if any, black heart, and from the sale of fruit our pocketbooks are fatter.

The business now has reached a solid,

sound basis, although very few new men have entered the business the past year, the ones who have studied it, as is necessary for any successful venture, to make it profitable, are keeping their pineries filled and in a number of cases are putting out new acreage.

The price for the fruit has been much better than it was the previous year, and especially good after the glut of peaches was over in the summer.

Our association will undertake a new manner of marketing the summer fruit this year, which promises to be very successful. The winter fruit will always market itself, at fancy prices.

The Smooth Cayenne has now arrived at its proper place, as, when in prime condition, it is Ne plus ultra of semitropical fruits. This has been accomplished through its own merits.

The cost of introduction has come somewhat hard on new growers, who expected too much and were not prepared to stay. Now that the necessary cost of advertising a comparatively new fruit has been paid and cities want it that did not know what it was two years ago, as shown by the market reports of the Smooth Cayenne for the past year, as compared with the same report of other pineapples, there is a fair future for this fruit.

Smooth Cayennes run eight to twenty to standard crates, other pineapples twenty to forty-eight. "You pay your money and you take your choice."

The cost of production has been lowered fifty per cent in the past two years.

The profit from fruit has been nearly doubled.

DISCUSSION.

Dr. Kerr—These reports, with exception of the first, have sounded to me a little like the boy whistling through the woods at night—a little whitewashing of what is being done in the business. In coming down here on the railroad we would think that in a little while, planting a few thousand acres every year, the industry would be overdone. I will say to the gentleman who has read Mr. Thornton's paper that he is a very cautious man, and although living right among this business in Orlando, I think he is not taking any great stock in growing pineapples. I have understood from very prominent pineapple growers that the business does not pay. Now, that is just what we want to know from these men who are in it, whether it does pay, and if so, give us some reason. This gentleman says he has shipped all over the east and north and tried to get a good market. It seems to be admitted that it was a sinking business. The question is now, does it pay, Mr. McCarty?

Grapes, Figs and Kaki.

By C. F. Barber, of the Committee.

Mr. President, Ladies and Gentlemen:

As one of your committee appointed on grapes, figs and kaki or persimmons, will say that I will make my report short, as I look for interesting reports from the rest of the committee. It is hardly worth my while to comment on the grape. It is so well known all over the South. Grape vines grow well in all parts of the South and with reasonable care they never fail to produce abundant crops. The grape may therefore be set down as one of the most satisfactory fruits grown in the State. Grapes ripen at a season when other fruit is scarce and always sell for a fancy price. In this State they are never injured by severe freezes; occasionally a late spring frost destroys the early bloom, but never hurts the vine enough to prevent its bearing a fair crop of fruit. Few fruit bearing plants are less particular about the soil in which they grow and few will yield so much fruit in proportion to the land they occupy and the labor they require. Where ever wild ones grow grapes are sure to do well. Grapes will grow and bear heavy crops with very little attention, still they do need some intelligent care, and without it they are sure to prove disappointing. The time spent in caring for grape vines is well spent.

The best soil for grapes is fertile, but not excessively rich soil that is loose and easily worked and which is underlaid by an open or porous subsoil. If the soil is too rich the vines will make a rank growth the fruit will be small, imperfect, sour, and lacking taste.

The character of the subsoil also is very important. The surface soil is easily changed by cultivation and fertilizing. The subsoil will remain unchanged. The roots of the vines are easily injured by excessive heat and drought or by standing water. The subsoil should be of such a nature that the roots can penetrate below the reach of intense heat and still not suffer from too much moisture.

When the subsoil is loose and porous it not only allows the roots to pass down through quickly, but it assists the water down below in passing back to the surface in time of drought, securing to the vine the uniform supply of moisture. Lands underlaid with hardpan should always be avoided for a vineyard.

The grape should be found growing more frequently on our farms than it is.

The Fig.

I shall have very little to say about the fig. There is probably no fruit in existence at this present time that dates back any further than the fig. The Bible tells us it was among the trees in the Garden of Eden. It is recorded that they sewed fig leaves together and made themselves aprons. We are told that the first figs introduced into the United States were brought to California by the Spanish missionaries, and date back as far as the beginning of the eighteenth century. From California they spread east. The fig ap-

pears to be well adapted to the soil and climatic conditions of the Gulf coast country. I do not know of any attempt to raise figs in Florida for commercial purposes. They do well here when you get them on the right kind of soil. There seems to be quite a mixture in the names of figs. Everybody who has a garden or small piece of land should at least have a few fig trees, the fruit coming in at a time when other fruit is scarce.

Kaki or Persimmon.

I regret to say that I feel my inability to do justice to this subject. It is no longer on trial, but has been proven to be thoroughly adapted to Florida as well as all the Gulf coast. When grafted on our native persimmon it seems perfectly at home. The tree is vigorous, prolific and has very few enemies. It is reported that the fruit is growing in favor in the Northern markets. Some of the most successful Southern fruit growers are now planting it extensively.

By judicious selection of varieties one can have ripe fruit from August until December. As it is better known it will be better appreciated, and, in my opinion, it will in years to come be one of our money-making fruits.

The Government Viticultural Experiment Station.

By Baron H. von Luttichau.

Mr. President, and Members of the Florida State Horticultural Society:

I report on the experimental vineyard in my charge at Earleton. The vines remained in fine condition last summer, bore plentifully and some excellent specimens of many varieties matured perfect and were photographed by Mr. Geo. C. Husmann from the Department of Agriculture, who devoted about a week to examining the vines last summer at fruiting time.

Some marked differences appeared in the different stocks used. Riparia Gloire for instance has proven unsuitable. Naturally, among some 150 odd varieties, they are slowly thinning themselves out—the survival of the fittest—and such as may prove suitable will show their value by remaining in good condition. We are not yet in a position to recommend certain varieties, but have several which we believe will come up to expectations.

This year, although the vines are generally in good order and showed heavy bloom, owing to the unusual cold, windy weather at blooming time, fruit set very badly, and there is little of it. The flower of the grape is more liable to be injured by cold, especially cold winds, than any other fruit. This is disappointing but not discouraging.

SUPPLEMENTARY REPORT.

By Irving Keck, of the Committee.

We have not yet got hold of the thing in the way of a cluster grape. I have heard wonderful things from a grape on the east coast, and now that the Society is

on the ground I trust it may be cornered and definite information obtained in regard to it. By Government experts I understand it is pronounced the Lenoir. The Scuppernong family is far the reliance in this locality and should be planted by everyone.

Figs.

The problem with figs is cold. The few days of warm weather that we are liable to have at any time in the winter start growth, then a light frost and the trees are back to the ground. Late and thorough cultivation, keeping up the growth as long as possible, seem to be about the only remedy so far.

Kaki.

It seems to me this fruit is not appreciated at its true worth; a campaign of education would be very helpful. It seems to be thoroughly at home in Florida and we ought to have it for four to six months. Gathered before it is fully ripe it will ripen and many take to it very kindly when better acquainted with it, that at first reject it. You all know the history of the grape-fruit, how for years it rotted in our groves, when with a little instruction it became a very popular fruit. The demand for good fruit of all kinds will steadily increase and it does seem that so good a fruit as this should not be neglected. Try all varieties; they are easily propagated, the wild persimmon is an excellent stock, better than the kaki. Graft and they will work out their own salvation. Then show your friends when they are in condition to use and how to use them, and you will have added another attraction to Florida.

DISCUSSION.

Dr. Kerr—I would like to ask the gentleman who read the first paper on this subject, whether the fig industry pays. I am interested in all these things, whether they pay for food or as an article of clothing.

Mr. Palmer—I would suggest that it pays in the way of an article of food, but when we go back to the Garden of Eden I do not know what construction they put the most value on.

I do not know of any one raising figs in Florida for the commercial value, and will say I do not think they would pay in that way. To make figs pay here, we would have to put them up the same as they do in California, and I do not think we could do it in Florida. Our damp salt atmosphere, I am told, would prevent the drying and putting away the figs. I have never had any experience, but think they are fine to have around the place for one's own use. I am very fond of figs myself. There might be some money made by putting a few on the market, but that is only my opinion, as I do not know that it has been tried in this State.

Dr. Allen—The statement was made by the writer of the article that the only thing to do for figs was to cultivate them. I would like a little information on this subject. I have one fig tree on my place which was not cultivated. Last year it was loaded with fruit, and this year it is also loaded, but there was no cultivation done at all.

I would like to say further, in regard to the statement made that the fig tree starts out in the warm days of spring and the frost kills it back, that that was not my experience this year. The last frost that killed back the ends of the orange tree did not hurt the fig tree at all.

Dr. Kerr—That gentleman is from the county I have the honor of coming from. I live in the northern part of the county

and will say that when the frost of the 14th of February came the trees were leafing out nicely, and they were killed down to the ground. This is another Volusia county story.

Mr. Carnes—I know they grow abundantly and beautifully in central Georgia; I have seen them growing there for twenty odd years. I know that where these figs grow the thermometer gets down to thirteen degrees above zero every year. I do not know about the cultivation in Florida, having been here only a few years, but in my grove I have a fig tree that has never been cultivated, and nobody pays any atteniton to it, but it is full of figs every year.

Mr. Street—The fig trees on my place in Volusia county in the freeze of 1895 were frozen down to the ground. In Tallahassee, where they had some very fine fig trees, they were frozen. In Alabama, north of Birmingham, there are very fine fig trees which have not been frozen down in winter.

Mr. Carroll—I have lived in the central part of the State for twenty-five years. Had figs in great abundance, but on the 28th of December, 1894, the winter that we had that nice little cold spell that we all remember so well, the figs were dormant, there was no bud or sap moving. In February following, 1895, the leaves were out, probably as large as a dime and you could see the fruit forming, but they were killed to the ground and the roots were killed. Those that came up from the stump again grew up and in 1897, on the 7th of March, were four feet high, 1 1-4 inches in diameter, and on that day they were cut down to the ground again.

Where I was raised, in Charlotte, N. C., my father had a fig tree twenty inches at the base, which lived and grew and never was killed. I have seen icicles on it there, but it was dormant, and I think it is because of those sudden changes of which the doctor speaks that makes it possible to kill fig trees here.

Dr. Kerr has very little frost where he lives, and that is why his tree is getting on so well.

Mr. Crane—There is a difference in figs; some are killed much more easily than others. The Celestial will stand the cold. I have a number and have had them a number of years. The Celestial gets through without any trouble whatever. My Celestial trees are twenty feet in height and twenty-five inches in diameter. They are set very close, and have never been injured at all. I think the difference is in the variety.

Mr. Butler—It was not a Celestial I had killed. The trouble in our locality is root rot. Some tell us how to use ammonia, when they ignore the thing that kills the fig trees. It has another enemy, which grows along that coast—fungus.

Mr. Terrell—I think by recalling the experience with orange trees in 1894 and 1895, it will somewhat explain the matter of the trees freezing. Our orange trees did not freeze in 1894, but in 1895, in February, the same trees died to the ground. It is the same with fig trees. If there is a little warm weather the sap begins to move and it does not take much to kill them.

About fertilizing the fig tree, I find it is a good chicken yard tree. If you don't want the chickens to have the figs, put a fence about the trees, otherwise the chickens will get them. I would suggest that the fig tree be put in the yard as an incubator.

Rev. E. V. Blackman—The Bolton or Key grape is equal in flavor to the im-

ported grapes. One of our citizens has some he got from the Experiment Station some of the fine varieties of the vinifera. One vine grew a bunch equally as large as any in the old country, but equal in flavor of those of the imported kinds. Grape culture with us is in its infancy. Very few of our farmers have even one grape vine, but we are looking forward to the time when we shall be shipping grapes in carload lots. Mr. Watson, here in Miami, has another grape that grows in a bunch that weighs six to eight ounces. Last year was the first year of bearing. We have evidence enough that the grape will do well in this country; not common grapes, but the finer varieties that are grown and so much sought after in the northern markets.

Mr. W. S. Hart—I would like to ask Mr. Blackman if the grape that has such large berries or bunches ripens up evenly, the variety called the Key Grape?

Mr. Blackman—In some instances there has been difficulty about the grape ripening evenly. In some cases it ripens up evenly where good culture is given. Fruiting of the finer varieties of grapes here is yet an experiment. I think the older vines I have mentioned are three years old. This year the fruit has set much heavier on them than on the second year vines.

[The Secretary, with Mr. Blackman, visited two vines growing on city lots; both of them very vigorous and fruitful, covering trellises fifteen or twenty feet long. All the bunches on one were covered with paper sacks; on the other about a half bushel were in sight, fine, large, healthy fruit. Varieties not known.]

Notes on Celery Culture.

By H. H. Chappell, of Sanford.

Sanford growers have probably the most ingenious system in this country combining in one both drainage and underground irrigation. The irrigation water is derived from artesian wells, from seventy-five to 150 feet deep, costing $50 to $75, and arranged along the margin of a field having a slight incline. The field is gridironed with a system of earthenware tile, about eighteen inches below the surface.

Nine-tenths of the truck farms are provided with drain tiles for irrigation, and those who have formerly used triangular wooden flumes for this purpose are taking them out, the Florida Agriculturist editor to the contrary, notwithstanding.

Nearly all the pipes used are unglazed. The main supply line is laid with the incline of the land, and the branch or irrigating pipes lead off from this as nearly as possible on the level of the land. By this means the pockets, as they are called, are mostly kept on the outer edges of the field out of the way of cultivation. The pockets are made with partitions and placed along the main supply pipe. The partition is made lower than the sides of the pocket, and is provided with a plug. Suppose the plug inserted into the orifice, the water

flowing in from the supply pipe will rise to the top of the partition, flow over and continue on to the next pocket. The pockets are about twenty feet apart.

It is not necessary for ordinary purposes to insert the plugs; a supply of water can be conveyed off latterly through the irrigation pipes. The plugs are used only in cases where it is desired to dam up the water, to throw out a supply to a limited area for a special purpose, as in setting plants in a drought or something similar. In such a case as this the grower inserts the plugs in the pockets in the district to be irrigated, turns on the water from the well and it flows down to the plugged pockets, where it rises through the soil by capillary attraction and irrigates the newly set plants.

It only takes an hour or two to throw the water underground right where it is wanted, as the fireman direct the streams on a house in the city. It perspires at the surface of the soil, showing plainly all along in the little hollows, and the plants are refreshed.

Suppose, per contra, that the field has been drenched by a flooding rain and the crops are suffering from an excess of soil water. The trucker simply shuts off the artesian wells and throws all the pockets in the field wide open by withdrawing the plugs. There is a rapid transfusion into the porous pipes—soil water in sandy lands readily percolates ten feet laterally,it reaches the conducting pipes, turns down the incline and is discharged. In an incredibly short time the field can be drained sufficiently to permit the resumption of farming operations.

The variety of celery we plant here is Golden Self-Blanching, almost exclusively. The seed is imported from France. We get our supply from Bolgiano & Sons, of Baltimore. We have experimented with other seedsmen to our sorrow.

I do not attribute our exemption from premature seeding of the plants to the variety of seed planted but to the non-occurrence of cold spells, such as we had in the winter of 1901-02. The winter just passed has been very favorable to the production of celery, with the exception of the warm and foggy weather of February and March, which caused the celery to blight more or less. Just a few degrees too hot or too cold is likely to prove fatal to a celery crop, and this past season has proven that our climate and location are the best in the State, because south of us the few degrees warmer were very detrimental to the celery crop on the Manatee as well as at Tampa. Our drainage is better, too.

North of us the only place where I have heard of celery being produced was at Palatka. The few degrees colder which the Palatka growers had checked the growth of their celery, then, when it started to growing again, being a biennial plant, it acted just as it would in the second season and ran up to seed prematurely. Three or four degrees colder would have caused practically all their celery to run up to seed, and, as it was I understand that with the largest grower there, who obtained his plants from Sanford, about forty crates out of 300 went to seed and was spoiled.

The Sanford celery this year was very nice indeed, better than the average season's crop; practically no running to seed at all. Our total output will amount to about 120 cars, averaging 350 crates to the car.

We do not wash our celery before shipping and trim it very little. It is made ready for the table with very little washing.

I would not recommend anyone to attempt the growing of celery in Florida except under the most favorable conditions. It is all a mistaken idea that it can be grown as easily as cabbage.

We plant our seed from September 1 to December 15. This gives us plants ready for setting in the field from November 15 to March 15. April and May celery this year brought the best prices. My last shipment, sold in May, brought the best prices of the year, which were $2.75 per crate f. o. b. Sanford. A shipment of 475 crates brought me over $1,300. This gives me as the total net return from three acres the sum of $6,120.72. The yield was 3,064 crates. Besides this, I shall raise a second crop from the land—egg plants, late potatoes, etc. One measured quarter-acre sold for $730. I attribute my success largely to the excellent condition of my land, through irrigation, and to my favorable sales, as I sold at home and had no losses.

In regard to the effect of cold, I would state that just across the lake from us the ———— place was frozen out this season while we were not hurt at all by cold.

Parties north of us had better go easy; and by way of suggestion I would advise them to plant their seed in December and set their plants in the field in February. This will tide them over the most of the cold.

Tropical Fruits Other than Pineapples.

By Rev. E. V. Blackman, of the Committee.

The mango, as Mr. Boggs told you, has been grown from the seed. Nearly all the mangoes in this county, up to two or three years ago, have been seedling mangoes. A stranger tasting them for the first time would think they were more fit for textile fibre and making rope than for eating; but in spite of the fibrous condition of the mango, it is becoming one of the most popular fruits on the market.

As to my own taste I will throw away a Mulgoba any time for the old-time mango. The flavor is very delicious, more delicate, and to me it is a better fruit all around. Still the time is near at hand when the seedling will take the background, same as with the orange. The time is coming when our trees must be budded to the finest known varieties. People ask for it, they eat the name instead of the fruit.

Take it with the orange; some of the finest oranges we have ever eaten were from seedling trees.

The process of budding is a very simple one, and one that is going to be used successfully here. So long as the green world lasts there will be the old turpentine mango, because people like it. The same is true of the avocado pear. People have been planting the seed from Cuba, thinking it would be superior to our varieties here. I was foolish enough to pay $2.00 for Cuban seed, because I thought the fruit would naturally be as good as that from the parent tree. It was a snare and

a delusion; because if you take mango seed and plant from the tree 100 of them, ninety-nine of them will be different in shape and size. Mr. Filer up here has these pears and I understand a good many were planted from the same tree; now he has scarcely two alike. This fruit, by the way, is coming into market. There is a demand for it. Last year avocado pears brought in our market from 30 cents to $1.00 per dozen right along through the season. There is no knowing how many alligator pears will grow on a full grown tree, because no one lives long enough to know how large a pear tree will grow. The avocado pear is going to be the most profitable fruit for the market.

We might say also of the sapadillo that in some sections of the country it is becoming a popular fruit. It bears shipping well. It must be picked a little green, but will go into market in first-class condition.

In regard to the growing of these I asked a grower the other day what is the best plan for growing the avocado pear and the sapadillo. He said just get as rocky piece of land as you can get, plant your trees and leave it alone for a few years. I asked another; he said, use no fertilizer for several years. Let them grow slowly, let them root slowly, and use stable manure and not commercial fertilizers. I had a little experience; had the fever, planted out some, wanted to see them grow, wanted to get them into market as soon as I could. I put on commercial fertilizer; they stood there for months without a sign of growing and finally died. Others I used stable manure on, and they have been growing ever since. This has been my experience and that of some others. That is about all I have to say about avocado pears.

DISCUSSION.

Mr. Hampton—I agree with Mr. Blackman in regard to avocado pears; that it is the coming fruit for this section of the country. The range where it can be grown is very limited. That is about its advantage, I believe, to those who grow, not to those who buy, and it would be advantageous to the growers. I have had very little experience, but would agree with Mr. Blackman that it is the coming fruit in South Florida, that is, the semi-tropical section of South Florida, Dade county. The fruit, in my estimation, will bring fancy prices, and it seems to be taking in our Northern markets. It is a fruit most people acquire the taste of very rapidly, and it is very nutritious. Taking it all in all, I know of no fruit outside of the pineapple that is more a coming fruit, that is to be planted for profit, than the avocado pear is in South Florida.

There is another thing that is in its favor. There is nothing injuring to the tree, no insects as with orange, which will take the blight or die-back more or less, but I have never seen a case like that with avocado pear. The sapadillo is another fruit that seems to be very well adapted to this section. The taste for it does not seem to have to be acquired.

Mr. Ellis—I would like to ask Mr. Hampton or Mr. Blackman if seeds of that fruit, the avocado pear, were sent out from the Agricultural Department three years ago? Can they tell us of the Mexican avocado pear?

Mr. Hampton—I do not know anything of it.

Mr. Ellis—I received from the Agricultural Department three years ago seeds of the avocado pear. They fruited last season. I wanted to see whether the ex-

perience of others corresponded with mine. I made a report to the Department that it was a very heavy fruit, was not as large and mealy and did not keep. I shipped a crate of them to the Department of Agriculture, and not a dozen arrived in good order. I shipped four crates of the kind we have down here, and all arrived in good order.

Mrs. Haden—We have a dozen trees of this Mexican pear, and while very early they are very superior in quality but very much smaller.

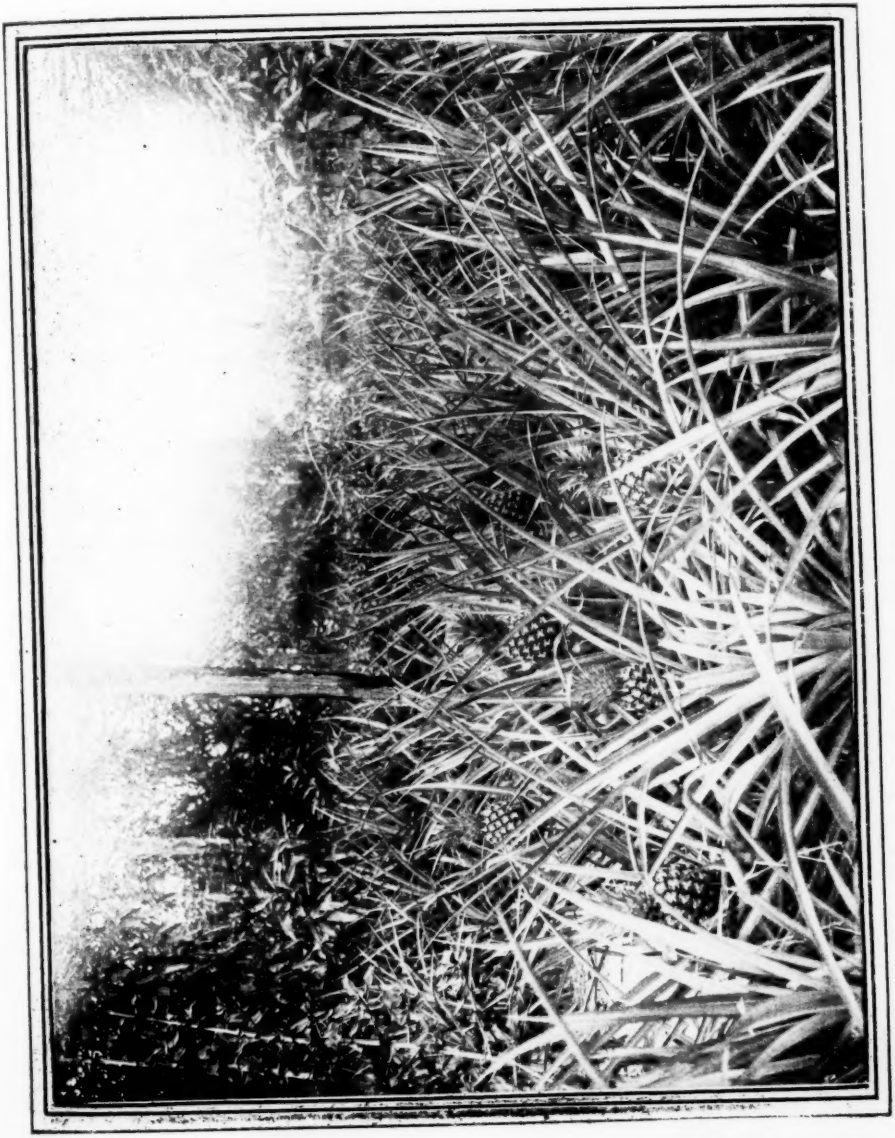
Mr. Pettigrew—I have had a little experience with mangoes and alligator pears. I find the alligator pears almost refuse to grow on high pine ridges. The mango will grow on that kind of ground. The Jamaica mango I hoped would have fruit on this year, but it is taking up all the time in blooming. It had a great cluster of blooms, but they have all fallen off. The three-year-old blooms very slowly. I have a two-year-old bud that was sent from Miami to me, which covered itself with blossom. From what little experience I have had, I think it would pay to bud and propagate that way and not raise seedlings. I am confident you can get fruit. It is well known that it shortens the time by budding. I think the alligator pear is one of the best fruits we can plant.

Member—In regard to the alligator pears, they do fairly well as seedlings. Mrs. Cole of Buena Vista shipped me a tree that was from the seed. This was a special one; she took the fruit off and sold it; she sold between four and five dollars worth that one year.

Mr. Blackman—The reason the alligator pear has been kept in the background in the Northern cities is perhaps the price that has been asked for it. To illustrate this; one of our Florida people who owned some alligator pear trees, had them growing on his place, met a young lady from New York City, to whom he became very much attached, he being a bachelor looking around for a helpmeet. He went up to New York to visit her. Going down Broadway, he saw some inferior alligator pears in a fruit shop. He asked her if she had ever tasted one and she said she had not; so they went into the store picked out three of the nicest ones he could, and laid down a five-dollar bill. To his surprise he got $2.00 in change.

People cannot eat alligator pears at that price, but when it comes into market at a price we can afford, and we can grow them at a reasonable price to the acre, it is going to be a fruit that will take in the market. In the lower end of Florida there is only a small place where you can grow the alligator pear. With increased growth and increased demand, I will say to every farmer and every fruit grower in all this region, plant alligator pears, and plant largely, and in a few years it will be a gold mine for you.

Mr. Hudson—I would like to ask a question in regard to the use of commercial fertilizers on avocado pears. My own experience coincides with other experiences I have heard. I have five or six trees on my place on Indian River. Two of the trees put out a very heavy crop of fruit, and we enjoyed them very much from September to December. I thought I would have a sure thing this year and fertilized very liberally just as I would for orange trees, and I don't think we will get over half a bushel of fruit as a result. The question to my mind is; is it not unreasonable to think that the nature of the tree is so peculiar that it will not bear the use of commercial fertilizer? I know people who think that commercial fertilizers



TROPICAL FRUIT HOUSE OF REASONER BROS. ONECO.

will kill the orange tree. Is not the fault with us instead of the tree? In case of the alligator pear, we must get a fertilizer properly balanced that will be of advantage to it as well as the orange tree. Can the gentleman offer any explanation why it will not stand commercial fertilizer?

Mr. Blackman—I cannot answer that. Perhaps the quantity of fertilizer I used was too much. I was trying to fertilize some young trees, and used about the same fertilizer I ought to have used on trees five or six years old. There is no question but that there is some commercial fertilizer made that will agree with the alligator pear or any other tree.

Mr. Hart—It seems to me that the gentleman on the right has struck keynote of the matter. There is just as much difference in commercial fertilizers as in the different varieties of fruit of the alligator pear. For instance, with the orange that was mentioned; we know if we give the orange tree an excess of ammonia from organic sources, we will draw it all out of balance; while if we have properly balanced fertilizers and from the proper source, they will make the orange tree healthy and in every way satisfactory. Now, if organic manures will give good results, why not apply fertilizer of about the same analysis as the manures, and perhaps put organic matter with it, compost or something of that kind? I do not think we should discard fertilizers because they are commercial. After a little experience it will be shown what is needed. Organic manures are scarce down here, and we can get commercial fertilizers in unlimited quantities.

Mr. Ellis—I believe the first settlers on Biscayne Bay before commercial fertilizers were used here used logger-head sponge, and they certainly produced very fine crops of alligator pears. My own experience has been that mineral fertilizers will kill alligator pears, but organic fertilizers or blood and bone will make the fruit. Commercial fertilizers composed altogether of minerals will certainly kill your trees. It has been repeated time and again on the Bay. Mr. Boggs and others use natural fertilizers altogether.

The Avocado Pear.

By C. W. Butler, of St. Petersburg.

In response to Brother Hart's request, will say that about seventeen years ago, when I first went to the Pinellas peninsula I found the avocado pear tree in almost every door-yard, and remember at least two trees that were eighteen inches in diameter of trunk. Like Adam of old I sampled the fruit and now think that the Garden of Eden tree must have been an avocado pear tree instead of an apple, for two reasons: first, because of man's probable inability to resist the temptation to eat the fruit; and second, was not the (pair) found under the tree? therefore was not the tree overhead a pear rather than an apple tree?

This tree with us is without an insect enemy; possibly a fungus may at times affect the bloom some, but its great weakness is its inability to endure cold; however, it is rather more hardy than the mango, but in the '94 of unpleasant memory our trees were killed to the ground, but sprang from the roots and were fruiting again in three years. I can not agree with Mr. Blackman to the effect that this tree must have stable manure, for they do well on any complete commercial fertilizer, but do need a large percentage of nitrogen, and will accept thankfully even stable manure and similar organic ammoniates, without contracting dieback.

Upon the sub-peninsula the trees are larger for their age and have more and larger leaves, than either here at Miami or in Cuba, but from what I hear they may be more fruitful here possibly because of premature maturity on a rock diet.

As to the trees coming true to the type from which the seed came, I can not answer for Cuba, but in Florida this tree "draws the color line;" the trees from the seed of the purple fruit remaining true to its maternal, at least in color, and the same may be said of the green and yellow varieties. Extreme types of form also show strong prepotency, but in minor details they vary from their parents, as seedling fruits usually do; in quality, however, they never vary enough to fail to be good, to an educated palate. In fact, of all the good fruits of North or South, with the exception of a really good mango, I call the avocado pear the peer of them all; for although lacking in juice and sweetness, it outranks all in richness, being seventeen per cent. oil, while its delicate pecan-like flavor lingers upon a natural palate as the odor of flowers upon the morning air.

As a rule, their appreciation is a matter of education. It is a case of, first, "you may have my part;" second, "I will try again;" third, "good;" fourth, "better;" fifth, "best." And this is the common experience. With us all old residents are very fond of them, and I have never known good fruit to sell for less than one dollar per dozen, and large ones retail for twenty-five cents each.

I have known a laboring man, even seventeen years ago, to work all day for one dollar and invest the same in a dozen of these pears at night. A fair sized fruit will weigh a pound, and I have known them to reach a weight of two and three-fourth pounds, but a two-pound fruit is a large one. In Cuba, I never saw a native eat an orange, but the "aguacate" was a common morning purchase for table use. The oil has been separated from the fruit for salad purposes, but is said not to be clear. The Cuban fruit is somewhat inferior in quality to that grown in Florida.

Question. How do you eat them?

Answer.—Sometimes the oily flesh is cut into small pieces and made into a salad by the use of salt, pepper, vinegar, and even olive oil and mayonnaise dressing; but aside from salt and pepper, the more you add to a good pear the more you spoil its finer virtues. I simply cut them lengthwise through the center, take out the large seed and its night-gown, use salt and sometimes pepper and with a spoon eat the butter-like fruit from its half-shell.

As to wholesomeness, upon a diet of mangos, avocado pears and whole wheat products I gained six pounds, and it was the only one of many diets that caused me to gain even a pound.

Southern Wilt Diseases and the Breeding of Disease-Resistant Varieties.

W. A. Orton, Assistant Pathologist U. S. Department of Agriculture.

Mr. President, and Members of the Florida State Horticultural Society:

In coming before you with this subject I cannot speak from any experience gained in Florida. The work on which this paper is based was done by me in North and South Carolina, Georgia and Alabama, during the past four years, for the U. S. Department of Agriculture. Nevertheless, some of the diseases I shall discuss occur in Florida under conditions similar to those where I studied them, and they are all so much alike that investigations on any one will be of value in seeking remedies for the others.

The wilt diseases form a class of closely related maladies of cotton, cowpea, watermelon, cabbage, tomato, flax, sesame, aster, carnation, pea, pineapple, etc., caused by fungi belonging to the form-genus fusarium. The term "wilt" ought to be restricted to this class of diseases and different names should be applied to other troubles where the wilting of the foliage, though a prominent symptom, is due to other causes.

The symptoms of the wilt disease vary somewhat in the different plants but are in the main similar. In cotton the trouble appears at any time after the plant is a month old. The leaves may suddenly wilt, though the soil does not lack moisture, and the plant dies. Or perhaps more often, the leaves will turn yellow between the veins and wither and dry up at the margin, the wilting progressing more slowly.

An occasional plant may recover and make a stunted growth. More rarely one seems to escape altogether, and this fact is important, as will be mentioned later.

The cowpea sheds its leaves quickly when attacked by this disease, so that there is rarely a pronounced wilting. The outside of the stem often shows a bluish discoloration.

The watermelon vine may wilt and die in a single day, even when nearly full grown. The disease is manifest in the cabbage by the leaves wilting and turning yellow, the veins becoming browned. The leaves drop off, sprouts starting from the axils.

In all these cases a prominent symptom is the brown discoloration of the wood vessels, as shown when the stem is cut off. If a thin section from such a stem is examined under a microscope, the water-carrying vessels will be found to be filled with fungus mycelium. These threads, which are colorless or light brown, cross and interweave until the water current in the stem is stopped, thus producing the wilt of the foliage. These fungi propagate themselves rapidly. There are four distinct spore-forms in those varieties which have been carefully studied. First; small spores or microconidia are borne inside the vessels. Second; when the plant is dead the

fungus pushes out through the stem and forms on the surface pink cushions bearing countless sickle-shaped, three to five-celled spores. Third; a chlamydospore, or resting spore, is formed from the mycelium when it becomes old or dried up, and the fourth, or perfect form, is produced on the roots under ground, as bright-red, pear-shaped perithecia, about one-twelfth of an inch in diameter.

Distribution.

The fungus is carried from field to field by the drainage water or by plows, or on the feet of men or stock. It also spreads by direct growth through the soil. These are all strictly soil diseases, the fungus entering the plants through the smaller roots and growing upward. Their presence in the field is first noticed in spots or areas that are more or less well defined, where the disease reappears each year, if the same crop is planted. The fungus will live in the ground for a number of years, even where no susceptible crop is planted. This permanent nature of the infection is one of the most serious phases of the problem, as it would seem only a question of time before the fungus would become so widespread as to seriously restrict the cultivation of the affected crop. Not all soils are equally affected, however. Experience has shown that wilt diseases are most injurious on sandy and light soils, while black alluvial lands are not so badly attacked and clay soils are practically free from them.

As compared with some other diseases, little has been published on this subject. Dr. Erwin F. Smith of the Department of Agriculture was the first to fully describe the wilt in 1899, though Atkinson described the cotton wilt at the Alabama Experiment Station in 1892, and articles have since been published by others in this country and abroad.

Cotton wilt occurs from North Carolina to Louisiana on both upland and sea island cotton, and thousands of acres are affected by it. It occurs to a considerable extent in Northern Florida and Southern Georgia on the sea island variety where it is commonly known as "black root."

Cowpea wilt is scattered over the same area, and the watermelon wilt occurs from Maryland to Florida. In South Carolina and Georgia it is well recognized by most growers that watermelons will not succeed twice on the same land, and there are now large areas where melon-growing was once an important industry, but where it has been entirely abandoned on account of the wilt. This is one of the most virulent of the wilt diseases, and it is hard to say where we shall get our melons in a few years unless a resistant variety is discovered.

Cabbage wilt is injurious in portions of New York, Maryland and North Carolina, and doubtless will be found widespread when more carefully investigated. Tomato wilt has its headquarters with you here, but also occurs in other states.

Not Bacterial Wilt.

This fungous disease should not be confused with the bacterial wilt, which also occurs in this State on tomatoes as well as potatoes and eggplants. Both are hard to control, but the bacterial disease is not especially a soil parasite, though the germs may linger a short time in the ground, and the fungus wilt probably does not attack other plants. Flax has recently been shown to do much harm in

North Dakota and adjoining states where the presence of the fungus in the soil leads to failure when flax is planted successively on the same land.

Related diseases of aster and carnation are troublesome in the Eastern States and the garden pea in Holland and sesame in Turkestan are aso known to be attacked by wilt diseases, while a fungus believed to belong to this class is probably the cause of pineapple wilt in this State.

It is important to note that so far as our present knowledge goes each of these different crops is attacked by a specific fungus, and the diseases are not communicable. We know that the cotton wilt fungus does not attack watermelons, though there are no visible differences between it and the watermelon wilt fungus, and neither of these fungi attacks the cowpea. It some times happens that more than one disease is present in the same field; for instance, cowpeas and watermelons may both die when planted together, but the weight of evidence indicates that the fungi causing the troubles are two distinct varieties present in the same field. We have been able to produce the wilt of watermelons, cotton and sesame by inoculation with pure cultures grown in the laboratory, but cross-inoculations, from cotton to watermelons, etc., have always failed.

Remedies—Fungicides and Fertilizers.

From the nature of these diseases, it is evident that the use of fungicides on the soil offers little hope of success and extensive field experiments along this line have given no results. Contrary to the opinion of many farmers, there is no good evidence to show that the use of commercial fertilizers will produce these diseases. Neither is it possible to remedy them by modification of the fertilizing.

Rotation of Crops.

The continued cultivation of one crop on the same land greatly favors the spread of the wilt and a suitable rotation will do much to avoid infection. This point has been well learned by the watermelon and tomato growers. When land becomes infected, however, rotation will not remedy the matter, unless prolonged for a number of years, as the fungus can survive in the soil independent of its host.

Resistant Varieties.

The ineffectiveness of other remedies naturally led to a search for resistant varieties, and then to the breeding of new resistant strains. The most promising results have been secured along this line, and we have been led to hope that the solution of the problem is in sight. In discussing this work I shall speak mainly of the wilt of cotton, although that is not a horticultural crop, but this is done because more has been accomplished with it and the illustrations at hand will suggest what may be done with other crops.

No resistant varieties of cotton were found, though some kinds were less subject to wilt than others. It was noticed, however, that an occasional plant remained healthy even in the most diseased areas and it was later found that the seed from such resistant individuals produced resistant plants. This selection of seed begun on the Sea Island cotton, has also given good results with upland cotton as shown by the photographs exhibited herewith. Two hundred bushels of the Rivers resistant sea island cotton were

sent out for trial in Georgia and Florida this year, and upland cotton will probably be ready for distribution next year. Similar selection work is being done with watermelons and cowpeas. In the latter case a resistant variety was found in cultivation, the Iron cowpea. This has been completely resistant to wilt in all our tests, producing a large crop where all other kinds beside it were killed. It is also drought-resistant, and more remarkable still, has been free from the root knot worm or nematode wherever tested in South Carolina. This quality, if maintained, will make it very valuable for use in peach orchards and for a rotation crop on the root-knot-infected lands in this State. Further trials will be needed to establish this point. Prof. Hume found that when planted on badly infected land at Lake City, Fla., it was not entirely resistant and it is possible that under Florida conditions the resistance noticed in South Carolina may not be maintained.

In this connection it is important to note the close relation between wilt and root-knot. Root-knot occurs on sandy soils of the same nature as those most liable to infestation by wilt and the two diseases often occur together, especially in cotton and cowpeas. The presence of root-knot always complicates the wilt problem, as it is more difficult to find plants resistant to both, and it is necessary to adopt a system of rotation in which crops subject to root-knot are introduced only at intervals of several years. There is great need for further study of the root-knot question, from both the technical and the practical side.

The breeding of disease-resistant varieties is also worthy of being carried on in many other cases besides those mentioned here. It is the most promising method of dealing with some of our most destructive diseases, and which apparently can be controlled in no other way. Systematic efforts should be made along this line, bearing in mind that the secret of success lies in the selection of individual plants rather than varieties or whole fields.

DISCUSSION.

Mr. Walton—One thing I would like to ask, whether the lay of the land has any effect on this disease. Some of our growers, I notice, think that when water stands some time on the crop it has an effect in this way.

Prof. Orton—I have not had an opportunity to observe the conditions here, but I find that as with any other disease, when the soil becomes water-logged it most certainly tends to produce diseased conditions of the roots; but whether or not it will affect the root of the tomato, I do not know.

Mr. Walton—This is after the crop is over.

Prof. Orton—I do not think it makes any difference. I have made no observations that would bear on that point.

Mr. Pettigrew—There was a good part of the Irish potato land in Colorado that became so infected with blight it would not raise potatoes any longer. They put sulphate of copper into the measuring boxes of their irrigating ditches and let the water dissolve it so their land was saturated with a very dilute solution of the sulphate some weeks before planting, and no potato blight appeared on land so treated.

Prof. Orton—There is no wilt exactly similar to the case of cotton. Experiments have been carried on to determine

that point. Bordeaux mixture and sulphate of copper, with other formulae, as fertilizer, have no effect; that is, several hundred gallons of Bordeaux mixture did not prevent the wilt in the slightest degree.

Mr. Hampton—I would like to ask the question whether any of the members here have tried liming the ground several months in advance of the time they wished to plant tomatoes, and what effect that liming may have on this blight-infected land?

Prof. Conner—I can answer the gentleman in that respect. I made the experiment in the State of New Jersey, to find out the effect of lime on this bacterial wilt. I had two fields lying alongside one another. I used gas lime extensively on one field, and on that field I had no sign of bacterial wilt; but on the opposite field the plants were nearly eaten up with it. I have never tried this in Dade county, and would like to ask the gentleman if bacterial wilt applies to all sections of the country.

Prof. Orton—Bacterial wilt is much more common than the fungous wilt, and in New Jersey it is the most troublesome disease. It has been shown by some that the use of lime for bacterial wilt on the tomato is beneficial, but in case of the fungous growth on tomatoes, which is the one most troublesome here, it is very doubtful whether it would be as good; but it is not safe for me to speak on the tomato wilt. Nevertheless, we have used lime for the cotton wilt in very heavy applications, oyster shell lime spread on the soil and allowed to slake there.

Mr. Hampton—About three years ago I was in North Carolina, and the neighbors assured me I could not grow tomatoes. In the fall I applied a barrel of slaked lime. In the spring I gave it another little touch when planting out tomatoes, and I was the only one in that neighborhood who had a crop of tomatoes.

Now, again, at my home in Polk county, I had a patch of tomatoes this winter, and have grown tomatoes on that ground ten years in succession, and I have yet to have a case of bacterial or fungous wilt, either one. I have used lime on that piece of ground. For lime to have this effect, it must be put on two or three months before you plant the ground with tomatoes.

Prof. Conner—I desire to coincide with the gentleman. On the farm I own in New Jersey we have been growing tomatoes for fifty years. My father put on lime every year. He used several hundred barrels of lime where he expected to plant tomatoes. I don't think I ever remember the wilt on his farm, but on the farms in that neighborhood there was lots of it in evidence. I am satisfied in my mind that lime is one of the panaceas of this blight.

Mr. Sadler—I have had experience with lime in Orange county, but not with success for a number of years. The tomatoes died where lime was applied, and we have given it up there.

The President—Ladies and gentlemen, this is very interesting, and we are under obligations to Prof. Orton for his address. He has brought out valuable information.

Mrs. McCallister-Beck—In regard to avocado pears, I have a great many friends down here, some little widow-women, who have a few trees. Where the trees are large and healthy they will say, "That tree is three or four years old, and I made $30 to $40 on this tree this year."

Mr. Roper—I will answer one of the lady's questions in reference to cotton in middle and north Florida. In south Florida it is not a question, not an experiment even. Twenty or thirty years ago it used to be a common crop, but as we have advanced we have learned better sense than to raise cotton down here, because other things pay better, not because it will not grow.

Prof. Orton—In regard to the tomato trouble, I will say that this disease has been very carefullv studied by Prof. Rolfs several years ago while at Lake City, and he is better able to answer questions than I have been, because my experience has not been with the tomato wilt at all.

Mr. Pettigrew—Lime has been tried and found successful; lime has been tried and found a failure. They are both evidently true. If true, one is because they do not get at the fungus at the time that lime could destroy it, so there must be some time during the life of the fungus when it is susceptible to the action of lime. If you will keep the lime there long enough you may get results. Something of that kind must be the explanation of the different results.

Prof. Orton—That has been our experience, but I would like to bring out clearly that you are talking about two diseases; bacterial wilt is one and the other is fungous wilt.

Prof. Conner—Does the fungous disease attack the leaf?

Prof. Orton—This fungous disease I have been speaking of attacks the root.

Prof. Conner—Where is it supposed to come from?

Prof. Orton—I do not know.

Fertilizers and Irrigation.

E. S. Hubbard, Chairman of the Committee.

In making this brief report I will try to refresh our minds a little in the philosophy of fertilizing.

There are four substances without which vegetation cannot make a normal growth. These are nitrogen, phosphorus, lime and potash.

The nitrogen is most healthfully assimilated as nitrate of potash, the phosphorus as di-basic phosphate of lime and in all normally nourished plants these substances will be found by analysis to vary but little from the chemical proportions of their compounds. Plants dissolve the nourishment they extract from the soil by acid secretions of their rootlets and to describe the relation of the fertilizers we apply to the soil to promote plant growth I will quote from Liebig, the father of agricultural chemistry, as follows:

"Most plants, perhaps all of them, contain organic acids of very different composition and properties, all of which are in combination with bases, such as potash, soda, lime or magneisa. These bases evidently regulate the formation of the acids for the diminution of the one is followed by a decrease of the other. Thus in the

grape, for example the quantity of potash contained in its juice is less when ripe than when unripe; and the acids under the same circumstances, are found to vary in a similar manner. Such constituents exist in small quantities in those parts of a plant in which the process of assimilation is most active, as in the mass of woody fibre; and their quantity is greater in those organs whose office it is to prepare substances conveyed to them for assimilation by other parts. The leaves contain more inorganic matters than the branches, and the branches more than the stem.

"The potato plant contains more potash before blossoming than after it."

Plant life builds up simple, inorganic substances to complex organic forms. Animal life transfers these complex forms to its own peculiar organisms and the refuse is broken up in structure and started in combination with the animal waste, on the way to ultimate decomposition.

The neutral element, nitrogen, in highly organized combinations, forms the neuclei of the sap protoplasm of all forms of plant cellular growth. Plants may assimilate it in a limited way as ammonia, which is alkaline and basic in its effect on the plant acids, or in the soil water as the acid products of putrefactive decomposition which especially on fruits are acid in their effects and often harmful to the health of the plant. But as before stated, it is most healthfully assimilated as nitrate of potash for then after the laboratory of the plant has converted the nitric acid into protoplasm the potash is free to act as a base for the organic acids that are converted into sugar, gum, starch and cellular tissue.

Nitrate of soda, in connection with potash, is a short cut way of applying nitrogen to plants when waiting for the nitrifications of sulphate of ammonia or organic nitrogen fertilizers in cool weather might prove unprofitable for the crop.

The soda base cannot be substituted for potash in the plant physiology, but the plant laboratory in some way exchanges the bases and the soda is largely excreted by the roots.

Phosphorus is mainly absorbed by plants as di-basic or two-atom phosphate of lime, commonly called reverted phosphoric acid. In this form it is easily dissolved by the mild root acids and enters into the plant circulation.

The lime is not so necessary an acid base as potash but partially performs that office and is secreted with silica in the cellular tissues. The phosphoric acid, however, in the sap combinations seems to be the agent or clearing house through and by which the sugar, gum and starch of the sap are transformed from one form to another and kept soluble while being transferred from one part of the plant to another to build up its tissue, fruit and seeds. A striking illustration of insufficient phosphoric acid can be seen on hard-pan lands where the iron of the soil water may render it so insoluble as to be unavailable for plant growth to the great detriment of the crop. This briefly describes the action of the elements that are absolutely necessary to plant growth without going into details as to the chlorophyll or green substances of the leaves that captures the carbonic acid of the air and starts it on the way to more complex acid forms or the diastase that is the medium of inter-conversion of the sugars, gums and starches.

Lime may take the place of potash to

some extent as a base for nitrates and also magnesia. Magnesia is said to be specially needful in the formation of seeds and sulphur is always found in the proteid compounds. Chlorine and sodium as common salt are often a considerable percentage of the ash of plants and though not considered essential to growth, and deleterious to flavor in sugar cane, for instance, may have a healthful effect on some plants as in preventing rust in cotton.

Iron, as sulphate of iron, has a tonic effect on some crops making the foliage look green. It may be noticed on hardpan land when sulphate fertilizers are used. The Irish potato will keep green longer on such spots than other parts of the field but will yield poorly, evidently from lack of available phosphoric acid, though complete fertilizers are used.

And so we come to the question of complete fertilizers, and it is a hard one, for men are not inclined to spend any more money for fertilizers than is necessary to make the present crop, and some soils can be forced to yield one or two or three crops on formulas deficient in potash or maybe nitrogen, to their permanent injury.

Again, there is the question of the excreta of the plant rootlets and it is an undoubted fact that some crops, if grown successively without some kind of changing off or rotation, will so poison or deplete the soil as to become unprofitable.

But especially should care be used in growing fruit trees. A tree is a perennial crop and a badly proportioned fertilizer may injure it beyond repair.

I think it may be safely said a fertilizer for fruit trees should contain nitrogen and potash in the proportion of one to three or about that of nitrate of potash, and from one-half more to twice as much phosphoric acid as nitrogen.

The tendency of experiment station work is to increase the potash in all farm fertilizers from less than the nitrogen to at least twice as much.

I cannot, however, see any reason for a proportion of potash to nitrogen greater than that of nitrate of potash for if the soil is rich in organic matter nitrification will go on as with liming at the expense of the humus and mechanical condition of the soil, unless an annual nitrogen gathering crop, like beggarweed, peas, etc., can be grown in the summer.

The question of formulas and materials is therefore largely a matter of the crop and local conditions and I will leave it open for discussion by the Society.

Dr. Stockbridge, of this committee may have something to report on irrigation.

DISCUSSION.

Mr. Butler—I would like to ask Mr. Hubbard for information on fertilizer for sandy soil. According to the analysis of the tree and fruit, we find a large quantity of lime out of proportion to the phosphoric acid we use. There is very little lime in most of our pinery land, and the question comes up, would it be practical to use a slight sprinkling of lime or not?

Mr. Hubbard—My opinion, from what I have heard and seen of lime on the soil, is that it breaks down and uses up the humus of the soil—makes it soluble; the nitrogen is set free by the lime, and it goes into the plant, circulates in that form. In that case, of course, there must be some lime in the analysis of the plant; even

where complete fertilizer was used, the soil would receive a little lime. The general belief is that liming carried on to a slight extent, not during growth, but during a resting period of some crop, is beneficial. To use enough lime to destroy the organic matter and not keep up the humus in the soil, is detrimental to the soil.

Prof. Rolfs—In this connection I would say that a great many experiments have been made in regard to the use of lime on the pineapple, especially on spruce pine land, but a large percent of them turn out indefinitely. In other words, we have about arrived at the conclusion that with the ordinary fertilizers used, no special benefits are experienced by the use of lime on this soil. Of course we do not know what is going to be done until we try, but on spruce pine land the addition of lime when ordinary fertilizers are applied, will be of very little benefit; in many cases it will not be safe.

Mr. Robinson—I would like to ask whether anyone has discovered any difference in using hard rock phosphate or bone, or any other form of phosphoric acid? What phosphate is the cheapest? And I would like to ask the reason why it is cheapest.

Prof. Rolfs—In our experiments with fertilizer on pineapples, we found that the use of acid phosphate was decidedly detrimental to the crop, while the use of raw bone was not detrimental but beneficial. In other words, if we applied phosphoric acid from acid phosphate, we could tell to a row where the rock began and the bone ended. Acid phosphate, in the way it was ordinarily applied, direct from the factory, I must say was not an advantage. It might be applied in a small quantity without disadvantage, but in any quantity as a field fertilizer I cannot say it would be beneficial. It is possible that from investigations in progress now by Profs. Miller and Hume, they may be able to tell us something about the matter.

Mr. Robinson—Have you put dissolved bone on the pineapple?

Prof. Rolfs—We have used ground bone.

Mr. Robinson—Does it have the same effect?

Prof. Rolfs—Not at all. Coming back to the point. I put acid phosphate on orange trees because it is a cheaper form of phosphoric acid, and the result is probably as good.

Member—Why don't you use it on pineapples?

Prof. Rolfs—Because it is detrimental to them. Some crops will stand it and some will not. Pineapples will not stand it under the circumstances in which it is ordinarily applied.

Mr. Robinson—I have seen acid phosphate give such good results as farming is carried on at Sanford, that I took hold of the acid phosphate here for about the same reason as the people who come here, for the simple fact that it was the cheapest.

Member—Was it the sulphuric acid used that gave these results?

Mr. Robinson—So far as using it on orange trees is concerned, I have been using it for twenty years, with good results; but still, as to the question whether bone dissolved by sulphuric acid would be any more beneficial to orange trees, I am not prepared to say positively.

Member—I think all the chemical acids are dangerous. The sulphuric acid is used to break down something in the rock itself. A few years ago I had great trou-

ble in making people believe that acid phosphate was injurious to the pineapples and they made experiments with it. Everybody knows now that it cannot be used safely.

Mr. Hubbard—In making acid phosphate, the manufacturers endeavor to use the sulphuric acid in such proportions that there may be no free acid, the products being sulphate of lime and soluble phosphoric acid. In light, sandy soils, however, the soluble phosphoric acid may be nearly as corrosive as sulphuric acid and burn the plant rootlets the same as ammonia from organic nitrogen fertilizers.

The relative values of acid phosphate or dissolved rock and raw bone depend largely on the character of the soil. Steamed raw bone and even phosphate floats on acid low lands have been found to give as good results as acid phosphate on Irish potatoes.

Member—I would like to ask Mr. Hubbard as to the relative values of dissolved phosphate rock and dissolved bone. Is it a matter of experience or theory?

Answer—I think the soluble phosphoric acid is equally soluble in both, but they are hardly a fair comparison as the raw bone contains organic matter which the sulphuric acid converts into sulphate of ammonia.

Dissolved boneblack is about the only form of animal bone that can be compared for results directly with dissolved phosphate rock. There is no iron or other foreign mineral matter in boneblack to induce reversion, but in phosphate rock there is a percentage of iron and alumina, though the manufacturers try to keep within certain limits. These induce and hasten reversion of the soluble phosphoric acid in dissolved phosphate rock to reverted and insoluble forms; and for this reason for appplications on top of the soil the dissolved boneblack is much more valuable than dissolved phosphate rock.

With quick-growing vegetables, however, there might not be a great deal of difference.

Mr. Butler—After all, it is the results we look for. I remember years ago of being in favor of boneblack. I have used acid phosphate with equally good results. I know a man who has used, to my knowledge, acid phosphate for many years, and his oranges are fine. His grape fruit are the finest without any exception, and he has used acid phosphate for years without cessation.

Mr. Blackman—Speaking on the subject of fertilizer, the discussion seems to run largely to pineapples. There are a large number of old orange growers here who have been at that work for years, and have gotten the subject of fertilizers down very fine, and know what the fertilizer is and when to apply it.

I find that in this section of the country for some reason we cannot use cottonseed meal for orange trees. When I lived in Marion county, I used cottonseed meal in great quantities on young trees, and found it would drive the trees ahead more rapidly than other fertilizers, if not used too late so the fruit would be soft; but down here I find it to the contrary. I know of one gentleman who came from Marion county who wanted to teach us how to grow a grove. He bought trees and put cottonseed meal on by wholesale, and he did not show us how to grow a grove. The man who has succeeded in growing trees has largely used mineral

fertilizer; blood and bone will not operate on our trees at all.

The only fertilizer that we can use safely, so far as experiments have gone, is commercial fertilizer, mineral matter. We use those with high success in orange culture and citrus fruits. Along that line I give you one instance, where only mineral has been used almost entirely with the exception of the velvet bean planted in the grove every year. That is the case with Mr. Richardson. Five years ago he planted out his small grove, little buds not larger than your finger. This year he harvested twelve boxes of grape fruit to the tree—nice fruit. The fertilizer that has been used on that grove has been chemical fertilizer, with the exception of the velvet bean, which gives nitrogen. Last year his crop of beans partially failed on account of the dry weather, but up to that time, since the grove has been planted, that has been the treatment of the grove. There are other groves in this vicinity that have received the same treatment, with the exception of the velvet bean and we have found so far that the only fertilizer for the citrus tree in this county is commercial fertilizer. If any one in the hall can suggest a better plan, I would like to hear about it.

Mr. Robinson—I would like to hear from the President on that subject.

The President—The President has enough to do to keep track of the meeting. I don't think it worth while to take up the time on this subject, but will say I would never use cottonseed meal. I think commercial fertilizers are the best. As to the kinds, that depends on what you wish to do with it, to make fruit or to make growth; also the character of the soil and the natural fertility and humus in the soil when you start. It is a very broad question, a great question; one could talk about it all day. I will simply say this: I would not use cottonseed meal by itself. Commercial fertilizers are adapted to any use you want of them. There is a great deal in knowing how to fertilize by indications. When you have learned that, you are a great way on the road to proper fertilizing. When you can read what your trees are telling you they need, you will know something about proper fertilizers.

Mr. Butler—I would like to know what you have learned from phosphoric acid.

Mr. President—I give it up.

Report on Forestry.

By Hon. Geo. W. Wilson, of the Committee.

I have nothing but a verbal report to make, for the simple reason there are so many difficulties in our way and various complications that relate to the question of forestry, we could not make a report to this Society that would be at all concentrated. Captain Garner, chairman of the committee, has been since last session very active and vigilant, making investigations as applied to other States. He has been successful in formulating a measure that is now pending before the Board of Trade

of Jacksonville, that will give the forestry question a good deal of strength. We received the co-operation of the turpentine people of Florida, who have a bill before the Legislature, which provides a penalty for boxing trees under a certain diameter. I have forgotten the exact wording of the bill, but all trees under twelve inches in diameter are prohibited from being boxed for turpentine purposes. The bill, some able lawyers thought, would be unconstitutional, because it would encroach upon the rights of citizens and private property, but this objection has been removed. All the turpentine and lumber people of Florida are very anxious to adopt any system that could be devised for the protection of forests, because with that rests their livelihood. That bill will pass the Legislature because it is backed by the Florida lumber and turpentine men. As it is now, the indiscriminate boxing of small trees has been one of the causes leading to the destruction of our forests and subsequent forest fires.

The bill will be proposed by the Jacksonville Board of Trade for the protection of the land that is described by metes and bounds by which, upon an agreement with the owners, the land will be fenced and protected from fires. There are other things in that bill that will go a long way toward the protection of our forests. At the present rate of destruction, both in hardwoods and pine, it would be probably not more than eight to ten years before the forests of Florida will be destroyed. The leading lumber people and turpentine dealers recognize this, and they are willing to go to any extent to protect the forests and establish laws, and obey these laws, that will tend to protect the forests.

I have nothing further to say on that line, except that it would be wise for you to create a standing committee to act on that question.

DISCUSSION.

The President—The present committee is for the present session.

J. S. May—About two years ago we planted at DeLand 100,000 catalpa trees. They now average seven feet and quantities of them are from twelve to fourteen feet high. Two men can plant 2,000 trees per day. The catalpa timber will last for years. I have seen railroad ties that have been in constant service for eighteen years—hard service—that are still sound. It is an industry that is coming forward. There is a railroad now that is negotiating with me to plant a large quantity. It is a fine timber tree to plant, and it is worth while to consider it. Mrs. Shimer wanted to use her waste land, and she had eighty acres planted They are a sight to be seen. The culture is—just simply plant them. Those trees will be worth 75 cents each before long, for posts. I know of posts that have been in constant service for twenty years, which are now as hard as lignum vitae.

Member—How do you make them run up straight? Do they not incline to be low and branchy?

Mr. May—By planting close. We trim them. The catalpa speciosa planted in that manner in a few years will grow up straight, nice trees. It will pay.

Lady Member—We have set out some catalpa trees. It pays on our twenty acres.

Member—Do you raise the young trees?

Mr. May—I get my trees from Indiana and pay $7 per thousand, eighteen to

twenty inches high. We had a drought come on when planting and I made a mud bath for the roots and had seven men plant them. I planted 4,000 trees per day, and ninety-five per cent grew; by putting the roots in this mud bath they will grow here with success. We planted 4,000 trees per day until 80,000 were planted. An old gentleman of my acquaintance, sixty years of age, planted a mile square, one and one-quarter million trees, and when he was eighty years old he had sold thousands of dollars' worth for posts. This shows what could be done. There is no humbug about this.

Mr. Hart—I would ask what measure is to be taken in the State Legislature about fires in the woods, and what is proposed.

Mr. Wilson—You mean the bill now pending before the Legislature? It is recognized that it is impossible to prevent a fellow from striking a match in the dry grass, but by strenuous effort and the force of public sentiment. it is hoped that the owners of large areas will see that this is brought about. We have consulted several lawyers. You can have the most stringent laws, at the same time you can not execute them. As fast as these various sections of land are bought up by corporations and companies in the business of lumber and turpentine, of course they will look after their own protection.

In regard to free ranges in Florida, a bill is pending directed toward that, namely, to prevent free ranges, which have been the source of all the trouble we have had in burning forests. The burning of forests is done to get the tender grass in spring for the cattle. As soon as you get clear of free ranges you will get rid of the burning of forests.

Mr. Hart—I have thought over this matter a considerable, because it has been called to my attention, forcibly, in my own neighborhood. Not only fences have been destroyed, but quite often houses have been burned, and very often these fires have been set by children. Cattlemen have done this ever since cattle were brought here, I suppose. It is contrary to law, the law allows the burning of woods only at stated times and requires notice to be given beforehand. Little children, in imitation of their elders, go along with a box of matches and when it is very dry they light and drop them and burn the country over. Almost every year these fires cost me hundreds of dollars by shortening my honey crops.

Mr. Wilson—There is a provision that compels owners of turpentine lands to protect their individual tracts from burning by forming fire guards fifteen to twenty feet wide.

Mr. Hart—What I was coming to was this. The appearance is that people do not seem to care whether the woods are burned or not. If any feature could be introduced to educate children and impress upon the older people the error of their ways, it would be helpful. I see no other way except to appoint wardens who will keep track of these matters, the appointment of whom will educate the people, who will recall to the minds of the parents and children that they are breaking the law and playing with a dangerous element that they cannot control, taking the bull by the horns, forgetting that the horns belong to the bull. It would be a good thing to provide for wardens, as in the fish business—someone whose business it is, if they see a fire, to learn who set it, and convict them. But if we can

teach them that it is wrong and contrary to law, that will have a very beneficial effect.

Mr. Roberts—Heretofore my home has been in Nebraska and Colorado. There where a prairie fire is set, it causes an enormous amount of damage; and of course laws were passed early, making a severe penalty for setting fires. A fire is such a calamity that people talk about it in that light, it is discussed throughout the community.

I never knew of the law being enforced except in case of tramps or something of that kind; but the people and the children obey the law, and I believe here, if a law was passed making a severe penalty, it would be effective.

In DeSoto county, within half a mile of where a certain fire started, it burned up a man's house and home. There is no question but that the fire was set to burn off the grass in the woods, but it destroyed several thousand dollars worth of property. This is arson. I came from a country where it is considered arson.

I want to say one word about the catalpa. I am glad to hear that it does well here. With us in Colorado it is one of the most valuable timber trees we can set out. I find that when grown from the seed the trees are of a straggling and crooked growth. With us it is allowed to grow six to ten feet and then cut off. It starts up in a single tall, straight stem and soon we have a forest of straight timber. We have posts just about as quick, and the sprouts grow so vigorously that in a very short time we have good timber. If it is successfully grown here it will be a boon to this country.

Mr. Wilson—I would suggest that it would be a good idea, in relation to the forestry question, to pass resolutions by this Society addressed to the Superintendents of Public Instruction of Florida asking them to endeavor to awaken public sentiment through the school children, and have prepared by each principal or teacher of public schools papers or lectures to be read and delivered at stated times or something of the kind; lectures from books on forestry, showing the danger and injury of fires to a community, etc.

Mr. Hart—I move that Mr. Wilson be appointed a committee of one to prepare such resolution. Adopted.

Mr. Wilson—I desire to state to the Society that as soon as we can perfect plans for what is now called the University of Florida, we propose to establish a division or College of Forestry. I had a long talk with the Secretary of Agriculture, and I believe we will receive the hearty co-operation of the Government, and that by the creation of that division some very effective work will be accomplished

Report on Entomology.

By Prof. H. A. Gossard, of the Committee.

Mr. President, Ladies and Gentlemen:

To about 375 circular letters of inquiry sent by me to the members of this Society I received about 235 replies. I doubt if another similar body in the United States would have given so satisfactory a response. That the large number of answers received was not due to my promise to not expose those members who are not possessed of a fly gun is proved by the fact that the non-sprayers are particularly shameless about their practice becoming known, and Mr. Hart gives so strong a hint to mention him by name among them that I suspect he not only believes in his practice but also enjoys a "bug" argument as well.

Of the 235 answers received, twenty-eight of the writers, because of not being at present engaged in horticulture or farming or because of depending wholly upon the advice of others regarding insecticidal operations and other like reasons, were unable to report. This paper, therefore, is compiled upon the basis of 200 replies in round numbers.

Some difficulty was experienced in deciding just whom to class as non-sprayers, since many reported that they sometimes sprayed for red spider or rust mite in bad years, but not for other insects. Where the practice of spraying was reported only for these and not for these as a regular practice, I called the writers non-sprayers. Of the 200 members reporting, sixty-five are classed as non-sprayers. If the orange growers alone were considered and the question related only to scale insects, I believe that nearly one-half of the membership would be in the non-spraying class. Six emphasized the belief that proper cultivation and plenty of fertilizer will enable trees to withstand scale attack and nine others specifically declare that lady-bugs, fungous diseases and fertilizing are successful in holding down scale insects.

From the remarks of non-sprayers, a few are selected as follows:

"I have been in the orange business for thirty years, and have had no experience with some of the insects you mention."

"I never spray, but fertilize four times a year and often work my grove."

"Non-sprayer for grove." (By several.)

"Thirty to forty acres of grove for twenty years; when young trees get bad with scale I cut off the worst infected branches, catch two or three dozen lady-bugs and place on the tree. I then apply two or three pounds of nitrate of soda as a fertilizer and the tree recovers very quickly."

"I bought a pump ten years ago, but have never used it."

"I quit some time ago."

"I hold about the same views as W. S. Hart."

"I took pains to encourage the lady-bugs and have not sprayed for ten or more years."

A few of those classed as non-sprayers are only so in practice, being sprayers in theory, and express regret that they have neglected what they believe to be a paying operation. Some of them express an intention of spraying in certain contingencies which have not yet arisen.

Of the sprayers, Mr. Porcher writes that he "believes in spraying" in so bold a handwriting that I think he wants it known, and another member solemnly says, "Let us (s)pray".

In the following list of remedies reported, the number of parties reporting its use is given after each remedy, and at the close of each list a few selected quotations are given to indicate dates, and frequency of applications, with results:

For San Jose Scale.

Twenty to twenty-five per cent crude petroleum with kerowater pump, 4; fifteen per cent kerosene with kerowater pump, 4; whale oil soap, 4; pure kerosene while tree is dormant, 2; lime-sulphur-salt wash, 1; McMaster's insecticide, 1; lady-bugs, 1; sulphur solution, 1; red and black fungus, 1.

"Dug up and burned orchard." "I use caustic potash whale oil soap once or twice a year as needed." "I have used kerosene as a paint with cloth brush on trunks and larger limbs on bright days. Last year the scale was bad; seems to be all killed now by red and black fungus." "Have none; neighbors use resin wash but I think fire is best." "Fifteen per cent kerowater about February 1." "Kerowater once or twice a year when necessity is apparent." "Crude petroleum, twenty per cent, with kerowater pump twice in winter; result very satisfactory."

For Armored Scales of Oranges.

Potash whale oil soap, 35; whale oil soap solution of sulphur, 2; Bowker's tree soap, 1; scour trunks and limbs with whale oil soap solution and sand, 1; kerosene emulsion, 14; kerosene ten per cent with kerowater pump, 1; ball potash and small proportion of kerosene in solution, 1, soapy wash water left over from boiling clothes with little kerosene added, 1; Hammond's Thrip Juice, 10; resin wash, 3; potash and sulphur solution, 2; lime-sulphur-salt wash, 1; fir tree oil, 1; pearline water, 1; Merle and Miller's sulphur solution, 1; lime-sulphur, 1; Kerr compound, 1; salt, 1; Microbicide, 1; cut off and destroy badly infested limbs without other treatment, 1; Millan's insecticide, 1.

"Five gallons of water to one pound pearline; one or two sprayings a year keeps them in check. Have tried nearly everything that has been recommended and find this the best." "Use Thrip Juice in April and June in combination with sulphur wash for scale and rust mite." "Last summer used Thrip Juice, three applications; was not satisfied with it." "Thrip Juice with excellent results; spray from April to June 20." "Kerosene emulsion three times per year." "Kerosene emulsion in extreme cases only." "Kerosene emulsion when and as often as needed." "Caustic potash soap, one pound to three or four gallons water. Have used resin washes and find them effective, but repeated applications injure trees." "Left over wash suds with a little kerosene added, used every week till scale is killed; three or four applications." "Potash whale oil soap with but moderate success." "Good's potash whale oil soap No. 3 is the best thing I ever saw." "Apply salt as far around the tree as roots extend, and paint

worst spots with kerosene emulsion." "Good's potash whale oil soap, eighteen pounds to fifty gallons of water." "Good's potash soap one to three times per year as trees seem to require it." "Good's No. 3 soap abou tfour times per year when the young are moving about." "Whale oil soap about four times per year when the seem to be on the ascendancy." "Use kerosene and water with kerowater pump in March or April, two applications three weeks apart; almost exterminates all scales." "Use standard kerosense emulsion and Good's potash soap No. 3 at such times and as often as necessary after the scales begin to move."

For Scales and Mealy Bugs.

The remedies given for these insects were so nearly a repetition of those given for the armored scales that they will not be repeated here. To the preceding list may be added tobacco dust, used especially for mealy bug, 4; sulpho-tobacco soap, 1; slaked lime while the dew is on, 1; Good's potash whale oil tobacco soap No. 6, 1; hardwood ashes applied while the plants are wet with dew, 1.

Sulphur and tobacco seem to be often added to whale oil soap, potash and soda solutions for these. Few of the answers seem to indicate that these insects are considered important, but an occasional one reports the real article in shape of the orange mealy bug and it is spoken of as an insect entitled to the highest respect.

For Red Spider and Mites.

Lime-sulphur spray, 19; lime-sulphur dust, 4; lime-sulphur and irrigation, 1; sulphur dust, 10; caustic soda solution of sulphur, 9; sulphur solution (solvent not given), 15; caustic soda solution of sulphur with soap added, 2; whale oil soap solution of sulphur, 4; potash-sulphur compound, 1; lime-sulphur-tobacco dust equal parts, with Jumbo sprayer, 1; sulphur solution and Thrip Juice combined, 1; ten per cent kerosene with lime-sulphur solution, applied with kerowater pump, 2; Merle and Miller's sulphur solution, 1; kerosene emulsion, 4; clear water under pressure to spray tops, 5; soap suds, 2; cultivation so as to conserve moisture, 2; whale oil soap, 3; tobacco dust, 3; Thrip Juice, 2; tobacco decoction, 2; Gold Dust dissolved in water, 1; Bowker's tree soap, 1; ball potash solution with little kerosene added, 1; Microbicide, 1; resin wash, 1; resin compound, 1; McMaster's Insecticide, 1; kerowater, 1; newly slaked lime dust, 1.

"Used a barrel of freshly slaked lime dust to about four and one-half acres of grove during the first part of last March while the dew was on the leaves; cleared out most of the spiders and their nests." "We sprayed for them with sulphur solution and got rid of them, but killed the lady-bugs and fungus that check the armored scale." "I sprayed once, using the lime-sulphur solution, but did not see that it did any good and it drove the lady-bugs from the trees." "Soda-sulphur spray every ten days or two weeks until they disappeared." "Three applications of lime-sulphur solution finished the purple mite last year." "One application of sulphur solution is sufficient, if properly made." "Sprayed with sulphur-lime with very satisfactory results."

For Rust Mite.

Sulphur-lime spray, 13; lime-sulphur dust, 6; lime-sulphur and irrigation 1; soda-sulphur spray, 14; soap-sulphur-lime

1; sulphur dust, 12; sulphur solution (solvent not given) 13; whale oil soap solution of sulphur, 2; flour (sulphur), 1; Merle and Miller's sulphur solution, 1; McMaster's Insecticide, 1; one-third tobacco dust, one-third lime dust, one-third flowers of sulphur, applied with a Jumbo sprayer, 2; potash and sulphur compound, 2; Springstead's emulsion (solution of sulphur and salt), 1.

"Spraying for this killed the lady bug and fungus and left armored scale to multiply so that the quality of the oranges was such that sales were more injured than if fruit had been rusty." "I use lime-sulphur spray, or air slaked lime mixed with flowers of sulphur (enough to make blow-gun work right) and with blow-gun scatter mixture over trees every two weeks. It is best done when dew is on in morning."

"I do nothing except to use plenty of potash in my fertilizer." "I spray grape fruit for rust mite, but not oranges. I have used caustic-potash-sulphur spray but find this injures fruit and now use lime-sulphur spray every three weeks during early summer and every two weeks during the rainy season." "Sulphur solution every three or four weeks from about June 1 to October 15. Don't plow later than July 15; keep weeds and grass down with scythe." "Four to six sprayings of Springstead's emulsion of lime-sulphur and salt." "With New York quotations for russets higher than for 'brights' is it worth while to spray?"

I did not list Bordeaux mixture which is used by three or four members, possibly because of a mistaken idea that the rusty orange is caused by a fungous disease known as rust instead of by an insect.

As the report thus far includes the more common orange insects, I am sure you will be pleased to have at this point a full statement of the practice of a veteran grower and I think Mr. Sampson will not object to his name being given as the author of the paragraph:

"We make our spraying of Good's Whale Oil Soap No. 3, in March; in April we follow with Thrip Juice. These applications are effective against scale, as well as the spider and mites. After this we depend upon dry sulphur for awhile; we use sulphur the second time, as nearly as possible, one fortnight after the first dusting; generally we can wait for a month or six weeks after this before the second round of two dustings. If scale shows up, we make a Thrip Juice spraying take the place of one of the dustings; this carries us to about the middle of September; after this date we use whale oil soap instead of Thrip Juice because Thrip Juice is said to take the flavor out of fruit if used too late. The sulphur for rust-mite should be continued through October. The nearer we come to all this the brighter is the crop."

For White Fly.

Resin wash, 7; resin wash in winter and potash whale oil soap in summer, 2; Montgomery's insecticide, 3; fungus diseases, 4; potash whale oil soap, 1; Bowker's tree soap, 1; sulphur fumes, 1; resin compound in winter, December and January, and caustic potash solution of sulphur for April, June and September, 1; defoliate and burn leaves in winter, 1.

"I use Prof. Webber's resin wash and believe in spraying." "Resin spray in December and January; whale oil soap in May." "Long ago I gave two applications of resin wash; depend on fungi now."

"This insect you will have to fight hard." "Move to Texas." "I use resin wash with good effect; spray three times per year and am almost rid of the insect now." "I have used resin wash but think several applications injured my trees"

For Aphis.

Tobacco decoction, 10; tobacco dust, 10; tobacco dust and sulphur combined, 2; whale oil soap, 3; air-slaked lime dust, 2; kerosene emulsion, 6; Roseleaf Insecticide, 2; Good's tobacco soap No. 6, 1; sulphur, 2; Thrip Juice, 1; resin compound, 1; lady bugs, 1; Microbicide, 1; tobacco decoction combined with kerosene soap emulsion, 1; Bug Death, 1; Gold Dust water, 1; resin wash, 2; soapsuds (ordinary laundry soap), 3; kerosene with kerowater pump, 1; rotation of crops, 1; white hellebore, 1; young chickens in garden with hen confined, 1; pure kerosene with Cyclone sprayer, 1; pyrethrum, or Persian insect powder, 1; salt, 1; land plaster, 1; Millan's Insecticide, 1; lime and sulphur dust, 1.

"Have had happy results with Good's Tobacco Whale Oil Soap and also with Roseleaf Insecticide." "I apply every three or four days, strong tobacco dust, manufactured by H. A. Shortuff, New York City, with a pepper box." "Found one application of resin compound (sal-soda and resin solution), effective wherever aphis could be reached." "Find whale oil soap solution of sulphur effective." "Kerowater every ten days." "Tobacco decoction unsatisfactory."

(It should be remembered that white hellebore, one of the remedies given, acts on the same principle as an arsenical poison, and is not, so far as known to me, applicable for use with plant lice. It is probable that the party reporting it had in mind the horn-worm or larva of the hawk-moth, which is sometimes called the aphis, in which case his practice is correct.)

For Curculio.

Jar trees early in season, 5; jar trees for beetles and use pigs to destroy fallen fruit 1; pasture orchard with pigs, 1; spray with London purple, 1; spray with Bordeaux and Paris green every ten days after fruit sets till it is two-thirds grown, 1; Bordeaux mixture, 1.

"In Ohio I used one teaspoonful of high-grade London purple in two and one half gallons of water, the first applications being made just after the flowers shed their leaves; a second ten days later, sometimes a third ten days after the second with successful results. Tried the same in Florida and killed all the curculio and half the leaves and fruit on the trees. A weaker solution might have done better."

For Thrips.

Thrip Juice, 6; potash whale oil soap, 3; Roseleaf Insecticide, 2; tobacco water, 1; nicotine insecticide with a little syrup or dissolved sugar added, 2; McMaster's insecticide, 1.

Good's Whale Oil Soap No. 3 before bloom; experience unsatisfactory." "Have experimented some; know of no effective wash for them." "Roseleaf for berry plants only, such as strawberry and dewberry."

For Army Worm.

Paris green, bran and syrup, 3; Paris green, 1; dig trenches and trap, 2; encour-

age quails, 1; fire, 1; arsenite of lime, 1: Thrip Juice, 1; handpicking, 1

"Used Thrip Juice with good effect" "Good result with Paris green."

For Corn Bud Worm, Boll Worm or Tomato Fruit Worm.

Green arsenoid, 2; arsenate of lead, 3; Disparene (arsenate of lead,) 1; Paris green, 7; bran, sugar and Paris green, 2. tobacco dust in silk when corn is tasseling, 2; Paris green for worms and lantern trap over water and kerosene for moths, 1; pick and destroy wormy tomatoes, 2; sulphur in bud of corn, 1; pick worms by hand, 4; pyrethrum or Persian insect powder in bud of corn, 1; dry lime and sulphur in bud of corn, 1.

"Good results with green arsenoid." "For the worm on tomatoes, use Paris green and Bordeaux every ten days until the fruit is grown," "Bran, sugar and Paris green is perfectly effective." "Pyrethrum where tried has given excellent results."

DISCUSSION.

Mr. Hart—In the presentation of this matter I am pretty well contented, as long as the professor has specified the sprayers and non-sprayers as he has, and will rest the case. It is in pretty good shape. I am glad he did classify them. Those who may spray for rust mite he classes among the non-sprayers. He classifies sixty-five out of 200 as non-sprayers under all circumstances, and, in another view of the matter, nearly half.

I mention this because some seemed to discover a new note in what I said last year, and learned from my last report that I would under some circumstances spray; but if they will go back to my writings for the last fifteen years, they will find that note has been there all the time. We can so handle our groves as to prevent rust to some extent, yet I know of no way to fully control rust mite without spraying; but unless the rust is a very great draw-back I would still advise non-spraying.

Now, about the rust. The loss there is not merely in the difference in price between the bright and the russet fruit. The rust mite does harm to the whole tree and the bulk of the crop is curtailed. Fruit that is attacked with the rust mite will not mature as large, as bright fruit; therefore it reduces the returns very materially, even if you can get the same price for the russet fruit, which you may perhaps, if you grow very fine fruit. I had sales in December at $4.50 for russet fruit, and fancy bright was quoted at $2.50 to $2.75; still my fancy brought more than my russet oranges. If I were troubled with the rust mite I would consider the disadvantages, but I have not that to contend with as I have had almost no rusty fruit until this last year.

There have been a great multitude of different combinations given in this paper for the control of the common scale. I advise never to spray for the common kinds of scale, as I consider that it does more harm than good. One reason why there is such an amount of success reported is that a good many formulas have been used by people who have not sprayed before, perhaps. I think that what they use in many cases had no effect whatever on scale. It had reached that state where it was practically cured any way. In one case, a party wrote of dead wood on the tree. When you are getting dead wood you are pretty well ahead of the scale.

The scale starts low down on the tree

and works up and out on the limbs. When the limbs die the last of the scale dies with them. Their enemies have been following them up and breeding among and in them, and feeding upon their bodies and eggs until they are cornered on these outer limbs. When they die there are left a multitude of enemies to search for any other live scale that may show up or have been missed.

One gentleman speaks of catching lady bugs and putting them on the trees. I think that amounts to very little. The lady bug is a very large insect, and you can see it. It gets the credit of doing all the good that is done. Late in the season when you pack your crop, you will discover most scale between two oranges, where the lady-bug cannot get. That is some evidence that the lady bug does good work, but the parasites and San Jose fungus and white-headed fungus, I am satisfied, do most of the work. They are microscopic. Each of these fungi when it gets hungry will put up its head and throw off its spores and can then be easily seen.

As to spraying for mites, I have never done so, yet I had a very bad case last year, especially, but if you will remember in my report last year, I made the prediction that there would be very few if any mites show up this year, because I had found a good many enemies preying upon them.. In my case this prediction came true. I have looked quite carefully for the purple mite, and found it on less than a half dozen trees. The yellow or six-spotted mite, as the yellow mite is called, I have found on one tree only. As evidence in this matter, I would like to have some of those who have sprayed carefully and continuously state their experience. One of our brothers who had a large grove to take care of said he would conquer them if he had to fight all summer. I want to know if the mites showed up where such spraying was done last season. That's where I would look for them. Now, as to the injury they have done, they certainly injure the trees seriously, but the injury to the fruit as a market fruit is yet undetermined. We can estimate this only by the results we get by shipping the fruit, by its size, etc. You will pardon me if I make a statement that may appear dogmatic, but there seems to be a very important point here. The fruit men of Boston and New York have written, also other fruit men who saw my fruit there, that I sent there the past season the best fruit that has ever gone into these cities. All of this fruit was covered with mites last April and early in May. The appearance and juice qualities were of the highest type, but the keeping qualities were evidently injured.

Criterion of Prices.

My late prices, as late as February and March, were $6 and $7 per box which is very satisfactory; so this fruit the mites were on was undoubtedly fine. My trees are vigorous and in good shape now, and I have never spent a single cent spraying. My trees are free from mites.

Dr. Inman—I have not any thoughts formulated, and cannot deliver any address, but I can tell facts, probably, so that my co-workers will understand me. I wish you would enroll me among the class of thorough sprayers. I am not talking from theory, but will give you my experience. I do not do my work by proxy but thoroughly superintend it myself.

With my own and what I have in charge, I control nearly 300 acres of or-

ange groves. The last few years of my life have been devoted entirely to horticulture with fair success. I have had no misfortune except the freeze of 1894. I have sprayed for the rust mite, red spider and all the foes of the orange tree, except white fly, dieback and foot rot. Have sprayed with all kinds of pumps, solutions and washes, often becoming almost disgusted in my endeavors, and have thought of cutting the trees up, but will say that the day of scale, red spider and rust mite has passed with me; not only with me, but with all my neighbors who are following a like course.

I am happy to report that after a good deal of work I have got the matter of spraying down to the minimum cost and a reasonable assurance of successful results. I grew last year a large crop of fruit, and spraying I do not think that in harvesting will say that as one of the results of $35,000 worth of fruit there was fifteen cents spent in my packing-house wiping fruit. I have no scale on my fruit. My neighbor, Mr. Harrington, has sprayed his fruit, and I don't think he had any scaly fruit—he has no scaly trees.

There is one point we are a little confused on, when to spray. We have been taught scale will hatch in quantities. I have watched very closely for them about the time usually set that we should look for them. They appeared in enormous hordes and swarms, but I have never found the broods hatching in the relays or installments that have been reported. I found them like barnyard chickens. As to the best time to spray, I would say early in the spring, probably about every ten to fifteen days in warm weather. In the early spring for the last two years I have used a good whale oil soap, and after the fruit becomes about the size of a cherry we use the sulphur solution in regular form, about three pints of the standard solution, that is, twenty pounds caustic soda and thirty pounds sulphur to twenty gallons of water. We use three pints of that to fifty gallons of water. I don't think we have made any other discovery that has helped us so much. With Hammond's Thrip Juice we can use that sulphur spray, and we are getting a spray compound therein that annihilates the scale, red spider and rust mites. The work is done easily. It makes a solution that costs less than twenty cents for a fifty-gallon barrel, and we spray thoroughly with that about every month for the first year. We think it necessary to spray every month until the first of July, when we will have annihilated the scale.

Probably it might be of interest to you to know what effect it may have on the market value of the crop. I sold all my fruit f. o. b. my station in Florida; have harvested about 12,000 boxes, selling it all except a few boxes of culls, that would not do to ship; and my fruit, the whole crop, culls, seconds, etc., has netted me a little over $3.03 a box, which has been satisfactory. I might report some sales at very fancy prices; for instance, grape fruit shipped to New York, billed December, brought $5.00 per box. Some of my customers objected to that; and Park & Telford changed the billing of my fruit from $5.00 to $5.50; in fact, some from $5.00 to $6.25 per box.

I hope there will not be enough said in opposition to spraying to deter the orange grower from entering the work at once and continuing thoroughly until he is satisfied that spraying does good.

Cost of Spraying.

Member: What did it cost to spray that $36,000 crop of fruit this year?

Dr. Inman—That is pretty hard to say. If you will give the spray account credit for the services rendered and the trees the benefits which the groves derive, I do not think you will need to consider the actual cost. My neighbor, Mr. Harrington, is a thoroughly practical man, and we do it in this way: we take ten men, six mules, three heavy pumps that will throw two streams each, and we throw a fog all over our trees, and we can wet our trees at the least possible expense. I should be glad to instruct any and all who wish to spray. If I have learned anything, I have nothing too good for my neighbor to know.

Mr. Sadler—I would like to ask the doctor how many trees he sprayed, and at what times he sprayed this season?

Dr. Inman—On the 15th day of April we began for the rust mite and scale, although I found no rust mite. You will find very little rust mite or scale or red spider in your grove after the first year.

Mr. Sadler—I would like to know what the additional expenses will be?

Dr. Inman—I believe that it is not possible to state it fully. With the second season the labor will be two-thirds, and half the first year's expense any season following, I think, will be sufficient to keep down the pest.

Mr. Hart—I never thought of cutting down my trees, although I have had scale in years past, probably as badly as any one. I was a champion sprayer before the doctor commenced raising oranges, but I gave it up, and since that time I thoroughly believe that the profit has been with me, and very largely so, over what it would have been if I had sprayed. I am very sorry that Mr. Porcher is not here. Like the doctor, he does things thoroughly, and thoroughly believes in spraying. He does it carefully, and can tell you what he has done; and evidence from such men as he is of value rather than those who spray only once in a while, and get everything out of balance, for they prove nothing. I do my work thoroughly in this line also. I leave my trees thoroughly alone, except to encourage the fungus a little; therefore my evidence is fairly good thus far.

The doctor thought the reason I do not is because I do not need to. The reason I do not need to is because I don't. His neighbors do as he does. Wherever one of the leading men in a neighborhood follows a course others follow him, and if it is successful all are satisfied. I grant that spraying can conquer the insects, but you have to spray, spray at continual expense all the time; you drive away or destroy your best insect or fungus friends and do not get any better results than those who do not spray and stick to it. My neighbors follow the same plan I do, are satisfied and make orange culture profitable.

In regard to washing fruit or cleaning it, I do not think fruit should be washed on account of scale, because anything that would wash the scale off I should fear would injure the fruit. I want to give you a little point now, and to many of you I think it is entirely new: Much of our fruit, especially late in the season, is covered with a defect that many suppose to be dust or carbon deposited on the oranges from forest fires, and like explanations have been accepted among the orange growers, but I was not satisfied. Last year I sent specimens to Professor Hume,

of our Agricultural College, asking him what it was. Professor Hume discovered it to be a fungus, but he could not fully identify it, although he said what he thought it might be. He has lately identified it as the fly speck fungus, and the oranges that we occasionally find covered with small dark specks show the same fungus in its fruiting stage. It is for that the fruit is washed. It injures the appearance of the fruit, and we wash to get it off but not to get rid of the scale.

Dr. Inman—I will not try to answer the argument of Mr. Hart, but would ask if there is any one here who has sold an unsprayed crop of fruit, the whole crop, of the amount I have the past season that brought the same amount of money, the same average per box. My neighbors who do not spray were glad, most of them, to sell their oranges at the station at $1.40; some got $1.60, but most of them $1.40; while I had no difficulty in selling at $3.00 and $3.50. I have sold none for less than $3.00.

One more matter that might be of interest is this, that during the marketing of our whole crop this spring, by Mr. Harrington and myself, not one box was ever reported as having arrived in the market in bad order; not one box of fruit.

Mr. Sadler—Doctor, do you attribute the difference in prices of your fruit to spraying and non-spraying?

Dr. Inman—I do, largely.

Mr. McCarty—I would like to say that my observation is that the difference in price obtained for fruit is as much in the difference in the men who grow and sell it as in any other difference.

Mr. Muirhead—I would just like to say a word about selling fruit. In our neighborhood, before the freeze, nearly all the farmers shipped oranges, and got back the magnificent sum of twenty cents per box. I shipped fruit at that time also, and I have got back $1.25, and I hold that the difference is in the way the fruit was packed. I was in a packing-house one day where a man was packing fruit, and I said to him: "Do you call that box packed?" He asked what was the matter with it. I told him I could put eighteen more oranges in it, and I removed the top layer and put in eighteen more oranges. He thought I could not put on the lid, but I had a man stand on it to pack it down.

Mr. Carroll—Whether or not he sprays his crop of fruit I do not know, but I do know that Mr. Lawson has some very fine fruit.

Mr. Lawson—Will say I have never sprayed. Have used some sulphur and lime mixed. I have been in the orange business about eighteen years now. Am just getting off my crop of fruit, and will say that I received more for russets than for bright fruit. I have quotations for russets, 128s $10.00 per box, and $6 to $7 for fancy fruit; packed very fancy, very nice, lates and culls, all shipped.

Member—Which did you ship first?

Mr. Lawson—I sold my best fruit first. My crop was short this year, and I decided I would get off my best fruit, while the price was good for good fruit, and probably my bad fruit would come in later and balance up my crop.

Mr. Blackman—The matter of scale and other insects is one we want to learn as much about as possible, and how to get rid of them. I want to tell the experience of Mr. Douglass who has one of the best groves in this neighborhood. If I remember correctly, that grove was planted about seven years ago and has never been

sprayed. I was talking with him a day or two ago, because I wanted to bring the idea before the Society and see if any one had the same experience. He has had a little scale all the time, but not enough to damage the trees. The only method he has ever used is when they appear to apply kainit, 1,000 pounds of German kainit per acre, and the scale has gone and the trees have come out healthy and strong. I wrote to the agent of the German Kali Works, and he wrote me back that he did not know there was anything in kainit that would kill scale, but wished we would follow that matter up closely and report to him, which I have done. Several others have tried it and all report the same thing, that kainit kills the scale. I want to know if any one else here has tried that remedy. It seems it might be possible that something might be found which could be put on the ground and taken up by the roots and carried through the trees to destroy the scale.

Mr. Carroll—The gentleman says he did not know what is in kainit. I have an idea that the matter he speaks of in kainit is nothing more than chlorine. At the same time this might throw the leaves off, and in that way get rid of the scale successfully. Speaking of the remarks of Professor Gossard on using the spray, I am certain from my observation, and it has been rather general, that spraying is absolutely essential for good fruit. I cannot see how it is possible, taking the section of the country in which Dr. Inman lives, not to use the spray. I think there are conditions under which a spray sometimes might be injurious, and I think Mr. Hart's position might be explained this way. You will understand he is in a hammock on the banks of the river, and his grove is laid off particularly against cold winds, a forty-acre oak grove on either side. There is no question in my mind that the rust mite does not live entirely on the orange, but on thousands of other trees. I have never followed it up to know whether it lives on other trees or not, but it is possible, and that Mr. Hart's groves, being in strips between these hammocks, is not troubled with rust mite.

But to get back to the subject of spraying. I owe Professor Gossard an apology for not answering his letter, but on the day I received the letter, I was spraying for horn-worm and black-head and other insects. I will say that unless you do and spray early, you had better quit planting the tomato.

Mr. Padgett—Common salt will answer the same purpose as kainit and it is much cheaper.

Mr. Robinson—How much and how should it be applied?

Mr. Padgett—Spread it on the ground under the trees. If you have not tried salt, make two or three applications. I put about ten pounds to each. If that does not clean the trees, I put ten pounds more.

Mr. Hardee—I would like to know the age of these trees on which he puts ten pounds.

Mr. Padgett—Large bearing trees.

Spraying on Pine Land vs. Hammock.

Mr. Hart—As I understand it, Dr. Inman asks a direct question, and I would not do my side of the spraying subject justice unless I made reply. He asked whether any one who had not sprayed had received as high an average price, net, last season for their fruit as he did? Outside of possibly two dozen boxes I have

sold no oranges for less than $3.00 f. o. b. my station, except injured fruit, much of which I sold to people who came to the packing-house and wanted oranges, but have shipped fruit that netted from $3.00 to $5.75. As to the remarks in regard to my location, that has been brought up several times. I have a pineland grove as well as a hammock grove. If you will think a moment you will remember shade favors the increase of scale. If you are looking for conditions for scale, look under palmetto trees. a shed, and where there is a clearing in heavy timber with orange trees partly under its shade; there is the place where they like to congregate. The natural conditions in my groves are as bad for scale as in any grove under the same treatment. I do not ask you to take my experience alone. If you will look back into the reports of this Society you will find some remarks from our former President, Mr. Adams, wherein he states that he bought a spray pump then laid it aside and would not allow it to be used. He claimed to have learned better, and I believe his conditions near Mt. Dora, in pine land, were like Dr. Inman's. Many others have had like experiences on that kind of land.

Professor Gossard—I wish to say just a few words. I have been in the State for three or four years, listening to the views about what should be done with orange groves. I think nobody has questioned the feasibility of spraying in the garden patch at times. I think there is something in location. I do not say that you should spray under all circumstances, or that it will pay you to do so. It may depend on the business you are following. If you are an orange grower and have no other business, then it is a question for you to decide whether or not you will adopt the practice of spraying continuously. If you are pursuing some other business, having but a few trees, then it might be another question. I have visited Mr. Hart's place, and am sure his location is more favorable than many in the State. It is very probable that there are many locations where his practice would not be successful, but I don't believe any one who goes through that hammock land around his grove can doubt at all that the conditions of moisture and heat are exceptionably favorable around him.

It may be the fact that the wind is more or less cut off by his plan of laying out his grove, thereby cutting off evaporation; therefore the plan works with him. I have noticed in the white fly districts, especially where the groves are near the coast and in the southern part of the State, the fungus may be relied on at times for rapid work, but I cannot say what it will do in other parts of the State. Professor Webber records red fungus as being plentiful at Gainesville and Panasoffkee. I have never seen it doing effective work away from the coast. It is very hard to see it. I know of many failures that have been made but one point I wish to make is this, which ever practice you choose to follow, do it, and do not mix the two. If you spray once or twice a year and do that in halfway fashion, you will destroy what benefits you have and get no benefits in return.

Dr. Inman—I thoroughly agree with Professor Gossard. There is a great difference in locality as to requirements of spraying. Our groves at Winter Haven are on high pineland. We have no bright fruit unless we protect it; scale, red spider and rust are almost as much to be relied

upon as the seasons. We are compelled to spray.

I wish to thank Mr. McCarty for his remarks as to the man who grows and sells the fruit, and will say that all my fruit was sold in car-lots at the station, and the buyers came for it, so there is not so much in the man.

[The Secretary will add that he saw several of Mr. Hart's account-sales of 1902-'03. They were all of round oranges. The lowest price received was $4.50; and from that they reached $7. The merchants of Boston and New York spoke in terms of the highest praise of the fruit.]

The Potato Crop at Hastings.

By C. G. White, of the Committee on Vegetables.

I am not coming to Miami because it seems in the interest of Hastings that I should go to Macon. Hastings is looking for a farm crop or a business to supplement the potato industry, and it looks like cane or cattle.

Twenty car loads of potatoes, I am told, go out tonight, (May 2). The crop to date is perhaps over half shipped. The indications are that it will amount to over 55,000 barrels. There are about 1,700 acres of potatoes tributary to our station, and several hundred more near by. The acreage has been doubling year by year. The increase has been kept in healthful limits by the poineer necessity of clearing land. There have been no "old fields" awaiting the speculator, but rather raw conditions awaiting the settler.

The yield this year promised to be phenominal; though the "late blight" appeared in force and cut it down, but generally it did less damage than was feared. The community as a whole has learned its lesson cheaply. Next year will see a lot of thorough spraying done.

Prices this year have so far been comparatively very low; but not so low that there is not a fair profit in a fair yield.

Most of the independent growers are in a shipping and selling agreement, and this has undoubtedly helped the situation very much, saving both a bad glut in the Eastern markets and a panicky selling for cheap cash here.

Potato growing methods are much the same this year as two years ago; to go into them would, therefore be merely a repetition.

The tendency in fertilizing is unmistakably towards larger doses, particularly in the proportion of ammonia used. I think I may state with considerable positiveness that in combination with seven per cent. soluble phosphate and eight per cent. potash, six per cent. ammonia is not excessive, and will give a better and earlier crop than four per cent. or five per cent. Ammonia in high grade blood and bone is largely used. The fertilizer used here is practically all mixed specially, because it is an old story that equal money's worth of the standard brands produces less results.

Sulphate of ammonia seems a poison to the plant in any amount on our sour soil. Nitrate of soda gets away too quickly for our practice. Acidulated bone does no better than acidulated rock. Therefore, why buy these or combinations of these? These ingredients are all valuable in their place, but that place is not under the Hastings potato.

There are strong indications that the total phosphoric acid in bone is as productive as the soluble phosphate in acid phosphate. Also that an investment of six dollars in acid phosphate in a potato fertilizer mixture is less effective than half of it for acid phosphate and half for floats. It must be remembered that our soil is sour.

I believe this is all I have to say, except that I hope you are having a very successful meeting.

Remarks by Rev. E. V. Blackman, of the Committee.

If you go out among our vegetable growers and ask one man how he cultivates vegetables, he will give you his method; go to another and he will give you another plan, fertilizer different, different in every particular; yet they both meet with success. Some time in the future, after we have been growing vegetables long enough to understand the atmospheric conditions and conditions of the soil, there will be some plan so that when a new comer comes we can tell him how to grow vegetables. A gentleman came here a short time ago, and went from one grower to another, asking their advice and opinion, and afterward came back to me. He said he knew less than when he started out. No one knows how to grow vegetables; but I think the time will come by and by in the fullness of time when farmers who are growing vegetables will have a method that can be depended on; a method that will meet every contingency.

Now, I want to cite an instance where one man tried an experiment. He had a good piece of prairie land; he plowed it carefully after the best plan, harrowed it, took every precaution that the land should be in the best condition to grow vegetables. He planted tomatoes and they grew off nicely; then, side by side, he set his man at work with a mattock, digging a hole about twelve inches wide and six inches deep. He planted tomatoes. He fertilized one piece; the other he only kept cultivated, the weeds cut down and the top of the ground mellow. With the other he simply threw the fertilizer around the plants and left them to grow. To his surprise and to the surprise of others, at gathering time when there was a careful accounting of the two crops, almost exactly the same amount of fruit was gathered from one as the other, and equally as good. A little less than 500 crates to the acre from each; one grown at an expense of about half of what the other was. I do not believe that is a good plan or good farming, but in this case it worked well.

The Season at Miami.

This has been a disastrous year with us. In March we had prospects of the largest crop of tomatoes ever shipped out of this county; there was very little disease among the plants, the stand was good in almost every field, that is, prairie field, but that rain came. The fields were far along so that part of the crop had been picked, other plants were beginning to bloom. The rain ruined the entire crop in this section, so we have not much to report.

However, I have this to report, that Mr. Flagler who is always trying to do something for the farmer ever since he has been in this county, immediately after this disaster employed a dredge to deepen the channel, which will go out in a few days, taking the level of this river to ascertain the feasibility of lowering its course so that we will never have any more overflows. This work will be done this summer, and next year when we come to the Horticultural Society we shall have something to report about vegetables.

Need of Combination.

There is one thing I want to talk about just for a moment, and it is not only worth the consideration of the vegetable men but of any man who grows anything. . There was a time when you men had a combination, so that with fruit shipped out from one common center all markets would be supplied, but it is not so in the vegetable line. Today, as farmers we go up against combinations wherever we are. There is hardly a thing we wear, eat or drink but that comes to us through a combination. The great financiers of this world know the value of combination; they know the value of putting their money into one common purse.

I want to say to you that the man who grows a vegetable crop, I mean the ordinary farmer, as he should be, wants today to grow that crop without going out and coming in contact with the markets of the world, not knowing where to ship his goods. There is not a farmer in this section who does not ship in the blindest possible way. The telegrams those fellows send us are misleading; but with a combination, with one common center and one man to control this output of vegetables, saving all this confusion, conditions will be such that in the North, East and West, we could hardly raise vegetables enough to supply the demand. I am not here to lay out any plans or to tell this audience how to do this, but I do come to tell you that we need such an association that can control these things.

The orange grower and the vegetable man have got to prepare to meet a combination on crates, for I want to tell you that within two years the price of crates will double through a monopoly. The paper we wrap our tomatoes in comes through a combination.

Everything in this world, so far as the fruits of the earth go, depends upon you; without you every spring of industry would be closed and finally run dry. They all depend upon us; they are the leeches that suck out our very life. We as farmers must get together and arrange it so that our products will go out to this great Eastern and Western country, and each one shall have its share. I do not want you to think by this that it does not pay to grow vegetables in this country; it does pay. I have known farmers to net on tomatoes $1,256 an acre, or a little less than an acre. I have known men to ship from 500 to 800 crates per acre. This is one of the most paying lines of business in the world; and we, like the rest of the world, like the great financiers of the world, we want a combination, and to get the best out of it we can.

DISCUSSION.

W. H. Earle—I would like to ask if potatoes grown in December are suitable for planting next fall.

Member—I have grown potatoes to some extent, and the only potato fit for

fall planting is from the spring crop, small potatoes, and they should not be cut. If cut, they will rot in the ground, but if planted whole they will make a fair crop.

Mr. Leonard: My method is a little different. The seconds are planted in the fall, then those fall crop potatoes are sent North in March and April and planted there for us to give us seed for our planting in Hastings the following January or February. In that way we know our seed is true to name, and by planting it in the North has a change of soil and is prevented from running out as quickly as it would if planted in Florida year after year.

Mr. Hubbard—My experience as to the comparative value of Northern seed potatoes and the Virginia second crop is that the Southern second crop is better for winter planting.

Mr. Leonard—They have planted second crop seed at Hastings this year. I did not plant any, but hear others say that the Spaulding No. 4 were superior to the second crop of Virginia.

Report on Peaches.

By W. D. Griffing, Chairman of the Committee.

In my report on peaches, pears and plums I will confine myself mostly to peaches, for as I see the situation we have very few plums or pears that are of any special value for planting in the State. Of the few varieties that we have I think that every home orchard should have their proportion of same.

The peach industry in Florida is not a new one, but the superior market varieties that are now being planted in the State are bringing it fast to the front and I believe it will soon be one of the chief industries. There is no fruit shipped from the State for which refrigeration is so essential as with peaches, and the time will soon come when there will be enough grown in several sections where it is receiving attention to warrant the use of refrigerator cars, thus reducing the cost of transportation and enabling the growers to place their fruit on the best markets in much better condition than is possibe by express shipments.

Peaches are, I believe, grown over a greater range of territory in the United States than any other fruit, yet the regions where they are successfully grown for market are relatively few. Now, what I shall try to show is, that Florida is one of these few regions and to give a short treatise on the fundamental points of peach culture as I see them in Florida. We all know that peaches can be grown in abundance for home use and local markets in nearly all sections of the State, and it is useless to spend our time discussing what varieties we shall plant, and how we shall cultivate a few peaches for the garden—any reliable nursery will give you this information.

Florida is essentially a horticultural State, the greatest source of our revenue coming from our fruits and vegetables,

and as I see it, our horticulturists for the most part, and especialy those in the old orange belt and the central and northern portions of the State, are overlooking a fruit that will bring quickest returns and show the best possibility for profit of all upon our list.

Florida's Advantage Over Other Sections.

In most of the peach growing sections aside from Florida, great care must be taken in selecting the orchard site owing to the danger of the fruit buds winter killing, either from extreme low temperatures or sudden freezes after warm spells during the latter part of winter or spring; while in Florida there is little or no danger from this source, provided the proper varieties for the different latitudes are planted.

The peach is essentially a luxury and especially so at the season when Florida markets her early varieties and a luxury that will tickle the palate of wealthy and bring the growers fancy prices. For the earliest varieties, such as Bidwell's Early, Suber, Maggie, Yum Yum, Florida's Own and Jewell, there is the whole United States as an open market, they ripening fully ten days to two weeks in advance of all others. For the second early are Waldo, Florida Gem, Imperial, Pallas and Oviedo, which ripen immediately after the former list, and in about the order named. There is little or no competition; what there is being from the early Georgia and Alabama fruit with such varieties as Sneed, Alexander, Triumph and that class, the fruit of which is of such poor quality and such poor keepers and shippers that they cannot be successfully shipped to the Northern markets. I have information from a most reliable source that thousands of trees of these varieties are being dug up and burned in central and south Georgia to give room for later varieties of better quality. Downing said of the Alexander peach, "It is quick to ripen and quick to rot," and what can be said of the Alexander can be said of the entire class of extra early peaches as planted in Georgia and Alabama. With this early Georgia fruit off the market Florida has a perfectly open field for fully one month, and in this month Florida peach growers can get rich. The early Florida varieties as heretofore mentioned are of good quality when well grown, excellent shippers, and if placed on the market side by side with the early Georgia varieties will sell from 75c to $1.50 per crate higher. This you can verify by writing to any of the large commission merchants in the principal markets of the country, who make a specialty of handling peaches and know the varieties.

As evidence of how the Georgia growers themselves value their early varieties, such as Alexander, Sneed, etc., I quote the following from an essay on peach culture, written by G. H. Miller, of Rome, Ga., and published in a press bulletin by the Georgia Experiment Station, where, in his remarks as to varieties, he says: "If planting for Northern and Eastern market we should grow only those varieties that can be marketed by, say, the 15th of August, as after that date the peaches grown in Delaware and Maryland and the other sections in that latitude are being marketed and to a great extent shut out profitable shipping from this distance." "It is true these sections can market their earlier varieties before that date, but the superior quality of our peaches going to the market at the same time insures us a monopoly of

the market." Now, if a man of Mr. Miller's standing who has spent the greater portion of his life growing peaches, and who is one of the three or four largest growers in Georgia, expresses himself thus relative to the quality of the early varieties as grown in Maryland and Delaware, which is almost at the threshold of the markets, what must the conclusion be when these same varieties are grown in Georgia and have to be transported from 900 to 1,200 miles, as compared to the superior qualities of our Florida varieties in point of flavor, keeping and shipping qualities?

In my opinion the case sums itself down to this: That as soon as Florida produces a sufficient quantity of peaches to make our varieties better known on the market, we will have practically a monopoly of the market until the 10th to the 15th of July when the good Georgia varieties commence to ripen.

Location of an Orchard—Selection of Soil, Etc.

For the commercial orchard, practically all sections of Florida north of a line drawn across the State from Punta Gorda to Ft. Pierce, where well drained pine land without a quick-sand bottom can be had, may be considered adapted. In selecting an orchard site convenience to transportation, the quality of soil and amount of drainage necessary are important factors.

If planting for carload shipments, secure a site if possible bordering a railroad or near enough so that a spur could be built to your packing house. This is important, as hauling fruit any considerable distance over rough roads is not only expensive but a great injury to the fruit.

Now as to soil, my first choice, if possible to find it, would be the better grade of pine land with a clay sub-soil. Second, if land with clay sub-soil is not available, select pine land underlaid with clay from three to five feet. Third, the better grade of pine land without clay foundation, such as the sandy regions in the vicinity of DeLand, Winter Haven and in some sections of Putnam county. Fourth, flatwoods land that can be sufficiently drained so that when thrown up into high beds with a row of trees planted on each bed the base of the tree will be fifteen to eighteen inches above high water. While I prefer the first and second choice of land, yet I have seen beautiful orchards on both the sandy land without clay foundation and also the flatwoods when properly drained. In the latter care should be taken to avoid quicksand. No particular attention need be paid to slopes or elevation of land. If you know a locality or piece of ground especially subject to late frosts, as we know there are many such, avoid them, as there is some danger from late frosts especially where the early blooming varieties are planted too far north.

Preparation of Land.

If possible, always use new land or virgin soil; however, new land is not absolutely necessary to success, as I have seen good orchards and profitable ones that were planted in old fields. The entire surface should be thoroughly broken as deep as the soil will permit. If new ground, it should be plowed twice and well harrowed. The Clark Cutaway Disk Harrow is one of the best tools available for subduing pine land. Stake off or mark the orchard so that you will know where each tree is to be set. Do not dig holes until ready to set trees. Florida sand digs too

easy and dries out too fast when disturbed to warrant digging holes ahead.

Distance for Planting.

Fifteen feet each way is the most popular distance for planting in Florida, and if trees are to be set in squares and for small orchards this is about right. But for commercial orchards much closer planting is advisable. Bear in mind that for best and surest results we should select virgin soil, clear and fence it especially for the peach orchard. This land is suitable for peaches only once and the orchard may be expected to be profitable for from seven to ten years.

Now, if planting trees 9x18 feet, giving us seventy-two more per acre than if planted fifteen feet each way, and if we can succeed in getting three crops of fruit of two crates per tree off this extra seventy-two trees before they are large enough to crowd so that every other tree has to be taken out, you will see that the fruit from these extra trees will nearly pay for the first cost of the orchard, the only extra investment being the small cost of seventy-two trees, which at the present price of trees for commercial orchards would be only a few dollars. I would, therefore, advise planting either 9x18 or 10x20 feet.

Planting.

The time for planting in Florida is from December 1 to March 15, preferably December 15 to February 15, as trees planted the last part of the season seldom make as good growth as those planted before February 15.

In selecting your trees get nothing older than one year; the three to four feet medium or four to six feet standard grades as listed by nurserymen are preferable. For the root pruning, recut all the bruised ends of the larger or lateral roots, trim nearly all the small fibrous roots, cutting them off to within one-half inch of the lateral roots and tap root; do not shorten the lateral and tap roots very much. Dig the hole fresh as you plant the tree; place the roots as near in the same position that they grew in the nursery as posible; let only fresh moist earth come in contact with the roots, thoroughly firm the soil by tramping with feet; you cannot pack Florida sand too hard around a newly-set tree. After firming the soil, rake around the tree a little loose earth or sand mulch. After the trees are set, trim the tops to a straight switch, cutting away all side limbs, being careful not to injure the buds that come out near the body on the side of these limbs, it being best to cut limbs from one-fourth to one inch from the body, cut the top back from eighteen to twenty-four inches long. Some growers prefer to cut them back even more than this. Never do this trimming until after the trees are set.

If done previous to setting, there is danger of many, and in some instances all, the buds being broken off in handling and planting.

Cultivation.

If a crop is planted, be sure that you return more in the way of fertilizer to the soil than the crop planted consumes. Clean shallow cultivation during the entire year is advisable. Plow the orchard shallow in December or January each year and cultivate shallow until July 15, after which time let the crabgrass come. Beggarweed will do no harm. Do not practice clean culture during the entire season after the first year.

Fertilizing.

Peaches on all of our Florida land need fertilizer. Of the three essential constituents of plant food, nitrogen, phosphoric acid and potash, nitrogen is of greatest value in promoting growth and forming wood. Thus the fertilizer for the first year's growth should contain five to six per cent nitrogen, four to five per cent phosphoric acid and three to five per cent potash, using from one to two pounds per tree, according to grade of land; applying same in two applications, the first in March or April just after the trees have started to grow, and the second in June or July. At the beginning of the second year if the trees show any considerable amount of fruit buds a fertilizer containing three to four per cent nitogen, five to six per cent phosphoric acid and eight to ten per cent potash should be applied, the large percentage of potash and phosphoric acid being necessary to the proper development, beauty and flavor of the peach. This second year each tree that will fruit should receive from two to two and one-half pounds of the latter formula, applied in January, preferably at time of plowing. Do not make the mistake of waiting until you see whether you are going to have a crop of fruit or not before fertilizing, as so many of us are tempted to do. We so seldom fail to have a crop that there is little or no risk to run. The quantity of fertilizer should be increased each year according to size of tree and amount of fruiting wood. After the fruit crop is off and just as the last cultivation is being given the orchard, an application of a formula similar to that recommended for first year should be applied, using about one-half the quantity of the strong potash fertilizer above directed. This will promote a healthy summer and fall growth and prevent leaves from shedding during the latter part of summer and early fall.

Pruning.

Peach trees when pruned and planted as I have recommended will push out several buds near the top very vigorously; three or four of these should be selected to form the new top, care being taken that they come out from different sides of the stem and not too close together. After three or four years when the branches from these buds grow to be several inches in diameter they should support a spreading vase-shaped top. The proper starting of a new top is a matter of some importance. If all the branches have been allowed to grow out from nearly the same point on the trunk, when the tree is laboring under a load of fruit, the giving way of a limb may involve the rest and split the trunk from top to bottom. After getting the tree started properly it has been the opinion of most Florida growers that little or no pruning was needed. I used to think the same myself, but now am of the opinion that a certain amount of pruning is beneficial if not necessary to best results.

If you will note the growth of the main limbs and the stronger of the lateral limbs made early in the season, say perhaps one-third to one-half of the entire length of the season's growth you will see is well set with both fruit and leaf buds, while immediately following is a long space of blank wood without fruit or leaf buds. These limbs should be cut back to where the well set fruit and leaf buds stop, getting rid of this blank wood. If you do not cut away this blank wood the buds from the first growth will seldom start, while the few buds at the end of the limbs

beyond the long space of blank wood will put out and the next year's growth will be made from that point, eighteen inches to two feet farther from the base of the tree than it should be. The fruiting wood should be kept as near the trunk of the tree as possible and not off on long spindling switches. By trimming out this useless blank wood each year you keep your tree low, compact and spreading and encourage the small fruiting limbs or fruit spurs to put out near the base of the tree, where we always get the finest fruit, and it is the easiest to gather.

Thinning.

This is an operation that is necessary to successful peach culture in Florida. It is the besetting sin of our Florida varieties to overbear. You will find it the hardest job in the orchard to get fruit properly thinned and one that puts the nerve of the experienced grower to a severe test. We should not have the peaches closer than from three to five inches apart, as equally distributed as possible over the entire tree, and when you commence thinning this way it will seem that you are destroying the crop, yet nine chances to one you will not thin them sufficiently. A large percentage of the edible part of the peach is composed of water, hence it is the formation of the seed that exhausts the vitality of the tree. The perfecting of the seeds of such an immense number of peaches will frequently exhaust the vitality of the tree so that it cannot produce good crops successively.

Peaches should always be thinned before the seed begins to harden while you can still run a pin through them without meeting any obstruction from the seed. If any show marks of having been stung or are in any way faulty they should be taken off and burned; also all fruit showing fungus of any kind and especially brown rot, should be picked off the trees or the ground and burned. By practising this thoroughly each year, you will keep wormy fruit and brown rot out of your orchard several years longer than if it is neglected.

Varieties.

For the territory south of the latitude of Ocala, Bidwell's Early, Suber, Yum-Yum, Maggie, Florida's Own, Jewell and Waldo would be my choice of varieties. For the territory north of this and east of the Suwannee River, the Jewell, Waldo, Florida Gem, Imperial, Pallas and Oviedo are, I believe, the best. The Angel is a good large peach and will do well either in the first or second named territory, but is quite acid and is not the best for Northern market. Beware of new and untested varieties. Do not plant extensively until they have been thoroughly tested both in orchard and market.

As to spraying for insects, fungus, etc., I will leave that to the entomologists and pathologists to treat, but will say that anyone engaging in peach culture must expect to spray if he expects success and especially for fungus.

Pears.

Only a limited number of varieties of pears will succeed in any part of the State, and these are of the sand pear class. The pear blight has been so severe in most sections of the State for the past few years that it has destroyed ninety per cent of the fruit crop. Little of encouragement can be said for pear culture until a remedy is found for the pear blight, or it exhausts

itself and its vitality and ceases to be as fatal and destructive as it now is. The blight is a contagious disease among pear trees and there is no reason why we should not believe that after a few years the blight will lose its vitality and cease to be so destructive, the same as nearly all contagious diseases attacking man or beast.

Plums.

At the present time there are only a few of the native varieties and crosses between the native and Japan varieties that succeed at all in Florida. A number of new seedlings and crosses have been reported during the past few years, some of which show considerable merit, but I should not advise extensive planting until more thorough tests can be made. Perhaps our committee on new fruits will have something of value for us in the way of new plums.

Remarks by B. M. Hampton, of the Committee.

Through some oversight, as I was moving my residence about that time, I did not learn that I was a member of the committee in time to prepare a report.

I will first say that in my section in Polk county and including the northern part of DeSoto the peach industry is only in its infancy. With few exceptions there are no trees in grove form. In what is known as the Lake Region of Polk and DeSoto counties the peach does remarkably well. I have grown them in a small way for twelve years in this section, both in DeSoto and Polk counties, and so far never missed a crop; neither have I ever seen the work of the curculio or his friend the borer in this Lake Region. So far as I know we are still free from these pests, I know of trees that have been planted for twelve years that are still sound and thrifty and loaded each year with crops of fine fruit. There are many varieties grown, but so far the Jewell and Waldo seem to come nearest filling the bill; both are too well known to need any description by me.

While pears are not grown to any great extent in south Florida, only a few trees for home use so far as I have noticed, they do quite well and so far seem to be clear of blight or other disease. While it is yet to be determined to what extent they can be grown for profit still it will repay anyone to have a few trees at least for home use. The Leconte and Kieffer seem to do the best for that purpose.

As for the plum, while the wild ones flourish and fruit year in and year out, still I have yet to find a satisfactory cultivated plum of the late improved varieties, though the Wild Goose in some sections does quite well and I have some hopes of the Excelsior, a seedling originated by G. L. Taber. These blossomed for me this year, but at this writing have not learned whether they held their fruit or not.

Strange to say, the apricot seems to give some show of promise at least for home use, and perhaps for profit. The tree is thrifty, free from diseases and fruits heavily each year. Fruit is ripe in May. Well worth trying.

DISCUSSION.

Mr. Blackman—I want to give a little experience of mine in New York State in the blight on pear trees. I went to a specialist, a scientific man, and told him what I was going to do with my pear trees. The blight came and was wiping out the pears

He did not know whether that would do any good. I went over to a machine shop, engaged several barrels of iron filings and took them home. I applied them very freely, so that the ground was completely covered with the iron. It did not rust quite fast enough for me, so I spread on ordinary salt. The dew fell that night and next morning I had a good crop of iron rust.

Within ten days of that time the blight began to disappear, so much so that I was encouraged. I got all the iron filings I could find, and every tree in that orchard became healthy and strong and bore fruit. I was at home two years ago and went to the old place to see these pear trees. I had not been there in twenty-five years. These pear trees were growing and were bearing very fine fruit still, but in that neighborhood not a pear tree was left

Mr. Jones, who had a very fine pear tree in his yard, hearing of my experiment, drove out to see the results. He insisted that I should go and inspect the trees. I put the iron filings around them and the same amount of salt, and his pear trees are living today. I do not know of a single pear tree in that county, not treated that way, but what is dead and gone. Several scientific men have laughed at me about my iron medicine, but it proved effective to the pear trees, and the trees are there now to show it.

Mr. Terrell—I should like to inquire about what I have heard called the black spot fungus, which appears on one side of the fruit in little specks about the size of a pinhead. If bad, that side of the fruit will not develop, and I would like to know if anything can be done for it. One of my neighbors though he would get rid of the black spot, but whether he succeeded I do not know; but in spraying he has gotten rid of some of his trees. I have not treated mine.

Prof. Gossard—I know very little about the fungus, though I naturally suppose the remedy that would be recommended would be Bordeaux mixture.

Report of Secretary.

Stephen Powers.

The State Horticultural Society this year is in the position of the marriageable heiress who has many suitors, and is in a state of distracting uncertainty as to whether those suitors are seeking her hand and heart or her fortune.

The Society is unable to determine whether the applicants for membership this year are seeking it out of a devotion to horticulture pure and simple, or whether they are desirous chiefly of securing the excursion to Miami. In fact, most of the applicants have said in their letters, with a charming frankness, "I want to go to Miami."

At any rate, the Society can safely admit that Miami rock is the most productive field of horticulture which we have cultivated; it has yielded us a handsome crop of membership. Up to the date of

this report the Secretary has booked four new life members and 699 annuals. Last year at a corresponding date the enrollment was only 305. Since the date of this report (May 5), enough more memberships have been received to swell the total up to about 760, a number never before equalled in the history of the Society.

Of these memberships Rev. E. V. Blackman contributed in two installments seventy-nine, and he has since added enough more to make over one hundred. Mrs. C. T. McCarty, of Eldred, has contributed fifty-three. Mrs. George L. Taber of Glen St. Mary, ten; Mrs. J. C. Whittle, of Largo, nine, and one life member. About ninety per cent of the above contributions have been new members.

As to the matter of transportation, it is only necessary to remind the members of the fact that ninety-nine per cent of the travel and traffic of the peninsula is conducted on parallel lines. The moment you attempt to break across these lines you are certain to encounter difficulty. The companies, proceeding on common sense business principles, must arrange their time-tables to accommodate the greater business and not the less.

When this difficulty was pointed out to the officers of the companies they readily agreed to hold their trains at Sanford and at Plant City on one day, to enable our members to make close connection through to Miami. This favor was extended by the Atlantic Coast Line and the Florida East Coast.

In his final circular the Secretary stated that excursion tickets would be on sale at all points in the State. This statement was based on a telegram which he had just received in reply to a direct question addressed to the headquarters of the associated railroads in Atlanta.

At a later date, in answer to the Secretary's inquiry, the several roads stated as follows: That the G. S. & F. would sell excursion tickets at Jasper, White Springs Lake City, and Hampton; the A. C. L. at all coupon offices; and the Seaboard and Florida East Coast at all offices.

The thanks of the Society are due the Committee on Transportation—Messrs. Morse, Blackman and McCarty for their active and efficient exertions in securing concessions in rates and other valued transportation favors.

Receipts.

1902—		
Annual fees received after date of last report,	$ 50	00
Two life members,	20	00
Back numbers sold,	56	50
1903—		
699 Annual memberships,	699	00
Two life memberships,	20	00
Total,	$845	50

Expenses.

1902—		
Hotel bills at Tampa, railroad fares, meals, hack hire, telegrams and freight bills,	$ 21	80
Secretary's salary,	75	00
1903—		
Stationery and printing,	61	15
Postage,	25	00
Two telegrams,	1	22
Total,	$184	17
Turned over to treasurer,	$661	33

Treasurer's Annual Report.

W. S. Hart.

Dr.		Cr.	
1902—		1902—	
May 22—To balance shown by last report,	$295 13	July 1—By Sec. Powers' draft No. 25,	$ 37 50
1903—		July 21—By Sec. Powers' draft No. 26,	258 58
May 5—Received from Secretary Powers,	661 33	1903—	
		May 6.—Cash in hand,	660 38
Total,	$956 46	Total,	$956 46

Report of the Executive Committee.

In the absence of the Chairman, Rev. Lyman Phelps, I have the honor of submitting the following report:

Since the last annual meeting this committee has met three times. The first meeting was on June 18, 1902, at the Duval Hotel in Jacksonville, present: Pres. Taber, Messrs. Powers, Painter, and Hubbard. It was voted that all standing committees be retained for the coming year with exception of that on "Good Roads and Marketing."

The President was authorized to appoint the standing committees. Secretary Powers was authorized to print catalogue in 1902 report. President Taber guaranteed any deficit that might occur in printing proceedings.

A committee on Nomenclature and Revision of Catalogue was authorized with President Taber as chairman, and he to appoint two others to present revised catalogue at next annual meeting for Society's action.

The second meeting was held March 18, 1903, at Mr. Powers' office in Jacksonville. Present: Messrs. Taber, Powers, Painter and Hubbard. The meeting was to consider certain propositions connected with transportation and arrangements at the next annual meeting, and the Secretary was instructed as to procedure in meeting them.

The third meeting was held May 7, 1903, at Miami; present, Messrs. Taber, Powers, Painter, Hubbard and Hart, at which the Secretary's and Treasurer's reports were audited and vouchers examined and approved.

Election of Officers.

The Nominating Commitee, consisting of C. T. McCarty, Dr. Geo. Kerr and E. S. Hubbard, made a report saying that, without any formalities, they would present for the suffrages of the Society the following ticket. (See List of Officers on a front page.)

The names of these gentlemen were taken up one by one, and it was moved and seconded that the Secretary be instructed to cast the vote of the Society for each one in succession, which was done.

The officers-elect returned thanks in a few graceful sentences; only those of President Taber and Second Vice President Wilson were sufficiently extended to require reproduction.

Mr. Taber said in part—As one of the charter members of this Society, as I said in my address the other day, there were eighteen of us to organize in Ocala in 1888. I am informed by the Secretary (I do not wish to anticipate his report) that the number now is somewhere in the neighborhood of 800. To see this Society grow as I have seen it, from eighteen to 800, is a wonderful thing. I cannot give you the exact figures or membership of other organizations of similar character—I think, I know there is no other State Horticultural Society in the South with a membership today equal in number to ours. I think also I am safe in saying that of the number of State Societies in the North, the large Northern States, well populated States, the old horticultural States, I do not believe there are half a dozen with the membership we have today. I think we have great cause for congratulations in another direction, because I do not believe there is another association like ours in any State in the Union, whose membership is composed of more scholarly, intelligent and scientific men and women.

I can only repeat I appreciate this honor, and shall certainly try to serve you to your interest.

Mr. Wilson—As the President seems to be in a retaliating mood, by requiring me to make a speech, I am going to propose an amendment to the Constitution. I propose that the salary of the President be $1,000 per annum. You will see great competition for the Presidency then.

I appreciate this compliment very much more than I can convey to you by words, for the simple reason I recognize that in doing this you clothe me with an honor that spurs me on to work for the great purposes of your Society. I recognize its far-reaching importance, as it relates to the whole State of Florida; I recognize that in you is the hope we have for many industries that are yet in their infancy. In you we expect the survival and renewal of hope at all times, as we have experienced in the past; forcing us onward and upward for higher things, which we shall continue to strive for.

I well remember 1894-'5, '96, '97 and '98, when I attended your meetings and to mingle with you, I saw that stamp, not of lost hope but of renewed vigor and de-

termination to bring order out of chaos, and you have mastered it; you have conquered; and I desire to speak with the highest compliment of the work you have done, of the great difficulties you have surmounted, and I predict for you and for the horticultural interest of this State for the next ten years, something that cannot be equaled in the world, because what you can produce cannot be equaled. We find on the Pacific Coast a State that is striving to reach the standard of your products, but in the markets of the country the buyers and consumers will attest that they will never be able to do so. Merit and excellency shall hold the markets of this country and by united effort you are sure to meet with success.

I thank you very much for this compliment.

Two Members Elected.

Mr. McCarty—Mr. Chairman, I have a very pleasing duty to perform this afternoon. I find by reference to our yearbook that only twice during the fifteen years that this Society has been in existence have we considered or elected honorary members. Whenever that has been done, it has meant something, and in placing in nomination for honorary membership this afternoon a distinguished name, we honor ourselves as well as honor the name that I shall place in nomination. I shall name a name that has been the shibboleth of the East Coast, a name that has been synonymous with prosperity, with advancement, a name we shall all delight to honor. I shall name a name that has yet much to perform on the lower East Coast. I take pleasure in putting in nomination for honorary membership in this Society the name of Henry M. Flagler.

Mr. Flagler was elected an honorary member.

Mr. Hart—I have a name I would like considered in this line, not for honorary membership but for a graceful recognition of past labors. To some extent those on the honorary list are not looked to to interest themselves so very much in our every day work in the future. We have one among us whose work in the past year and previous years deserves, it seems to me, the most hearty recognition, but we are not ready to lay her on the shelf, we need her help in the future. With this consideration I would move that Mrs. McCarty be made a life member of this Society. Her record during the past year is sufficient to warrant this motion.

President—Ladies and gentlemen, Mrs. McCarty has sent in fifty-three memberships. If a lady who can get that number of new names for us is not entitled to a life-membership, I don't know who is. I don't say this because I am in the chair, and trust you will excuse me if I am in the chair and talk a little before the motion is put before the Society. I am sure I appreciate the work she has done, particularly as she took the initiative in securing us such a large number of members, and took the lead all the way through. It is certainly a wonderful record of new members.

Mrs. McCarty is elected a life member.

Mrs. McCarty—I am not in the habit of making speeches. All I can do is to thank the Society for this honor.

Next Place of Meeting.

President—Ladies and gentlemen, the next thing is the selection of our next meeting place. Invitations from different places and towns are in order. In the first place, I would call attention to the telegram I read from Tampa the other day, which I will read again, dated Tampa May 5: "President Horticultural Society: The city of Tampa sends greetings to the Society, and requests that the next annual meeting be held here," signed Board of Trade of Tampa.

Mr. Wilson—On behalf of the Board of Trade of Jacksonville, I am instructed to extend to the Society a most cordial invitation to hold its next annual meeting in that city, believing that in extending this invitation, now that we have recovered from the disaster of two years ago, we shall give the industries of Jacksonville the chance to co-operate with the Society in the advancement you are making; and having that in view, it extends to you the most hearty invitation to have the next annual meeting there.

President—Two places in nomination, Tampa and Jacksonville. Are there any more invitations?

Mr. Nelson—I make a motion that proxies be accepted in voting.

President—They will be. It is not necessary to put that in a motion. It goes without saying.

One hundred and twenty-two votes cast—91 for Jacksonville, 31 for Tampa.

Jacksonville was elected the next place of meeting.

Cultivation of Citrus Groves.

By Prof. H. Harold Hume, of the State Experiment Station.

There is probably no practice connected with the growing of citrus fruits regarding which there is more difference of opinion than there is upon the question of the best methods of cultivation. The soils of our State are so varied, both in the amount of fertility and in the amount of moisture which they contain, that it is not to be wondered at that such is the case. To anyone who understands the nature and character of our soil it must be patent that in a large measure the system of cultivation adopted must correspond with the kind of soil. But after all, though practices may differ and many different methods may be advocated, it will generally be found that underlying each system from which good results are obtained, there is some broad, general principle.

Clean Culture or No Culture.

The practice of keeping the ground on which the orange grove stands perfectly free from herbage and thoroughly cultivated throughout the whole season, year in and year out, has been indulged in by many and is still followed by some. A soil so treated soon becomes depleted of its natural fertility and the humus soon becomes used up through constant cultivation, and the application of various chemical fertilizers. No amount of fertilizer will do the work it should if the soil once loses its natural body and becomes deficient in humus. In spite of every effort in the line of fertilizing, such a soil will become poor and infertile and the trees will show the result of the treatment by their unhealthy condition, and the owner will realize it in his diminishing returns. If clean culture is adopted humus must be supplied in some way, and the only feasible plan is to provide a supply by covering the ground with leaves and leaf mold from adjoining woods.

Any piece of ground denuded of its natural vegetation and so exposed continually to the burning heat of our sub-tropical sun, rapidly loses most of its fertility and becomes dead and lifeless. Many people regard the soil only as a place for roots to grow and live in; but it should not be forgotten that the soil is nature's food-producing laboratory in which multitudes of micro-organisms are busily engaged in preparing food for the trees. They fail utterly in their work if their natural element, a soil rich in humus, is converted by too much cutivation into a sand-bank.

On the other hand, many growers do not cultivate the soil at all. For some classes of soil this method is best but only those which are naturally moist. On low, damp hammocks, for instance, this plan should be followed. In some cases a heavy mulching of native growth cut and piled around the trees may answer in place of cutivation. On high pine land or on those lands naturally deficient in moisture it is not safe to follow the "no cultivation" method. Cultivation conserves soil moisture and increases the water-holding capacity of the soil. Perhaps never before in the history of Florida was the necessity for frequent cultivation so forcibly borne in upon all thinking growers, as it was in the spring of last year, and yet if all the moisture or even a considerable portion of that which the soil contained at the beginning of the season could have been held and dealt out gradually, there would have been sufficient for the needs of most groves. Frequent shallow cultivation would have helped materially in this direction.

Benefits of Cultivation.

Cultivation is beneficial in the following ways: It increases the water-holding capacity of the soil and conserves moisture both by allowing rain to sink more freely into the soil and by checking evaporation. It pulverizes the soil and allows the air to penetrate, thus supplying oxygen for the roots. It assists in setting free plant food and makes the soil fine, thus enabling the roots to reach all parts of it. In cultivated soils decomposition and nitrification go on rapidly, and if the materials from which nitrogen can be formed are present its formation takes place more rapidly than if the soil be left uncultivated.

The opening and loosening of the soil permits the rain to penetrate. If the sur-

face of the ground becomes hard and compact, the water would run over the surface or collect in puddles and disappear by evaporation. But if the soil is well stirred and loose, the water will enter.

Once it is safely beneath the surface, it is necessary to keep it there; it has gained entrance by passages through which it should not be allowed to escape. The water will again make its way to the surface by capillary attraction, passing upward through the minute spaces between the particles of soil. If the minute passages or tubes extend right to the surface the water rises to the top, comes out and is carried away by evaporation. The top inch or two of earth should be thoroughly stirred so that it may part with its moisture and become quite dry, then it acts as a "dust blanket" and the great amount of moisture below is not allowed to reach the surface. Thus the moisture is conserved and held for the use of the trees. During our rainy season it is not necessary to conserve moisture, but often in April, May and June, or even later, week after week goes by without a shower. That is the time when water is needed, the time for which preparation should be made before it comes. The horse and harrow are often a most excellent substitute for an irrigation plant.

An Experiment at the Florida Station.

In June, 1902, two samples of soil were taken as representatives of cultivated and uncultivated soil. Both were from the Horticultural grounds, one from soil planted in citrus trees, cultivated frequently from March until that time, the other, from a piece of ground which had received no cultivation at all during the season, but which had lain bare and exposed to the sun. The samples were weighed then dried and weighed again. The weights and differences were as follows:

Cultivated Soil.

Weight when collected, ...247.8 grams
Weight after drying, ...230.5 grams
Loss of moisture in drying.. 17.3 grams
Per cent of moisture in sample, $17.3 \div 247.8 \times 100 = 6.97$ per cent .

Uncultivated Soil.

Weight when collected, ...251.4 grams
Weight after drying,.....240.9 grams
Loss in drying, ... 10.5 grams
Per cent of moisture in sample, $10.5 \div 251.4 \times 100 = 4.17$ per cent.

The cultivated soil contained 6.97 per cent moisture, while the uncultivated soil contained 4.17 per cent moisture, a difference in favor of the former of 2.8 per cent, or, expressed otherwise, cultivation had increased the moisture content of the soil by 66.5 per cent. It is true that the water-holding capacity of most Florida soils, and particularly those rich in humus, is well up to the average, but this does not mean that every effort should not be made to hold and conserve the moisture for use during the spring drought.

Humus and Its Value.

Humus is a product from the decay of organic matter. If organic substances undergo decomposition they are resolved more or less completely into their former gas and mineral constituents. The intermediate substance formed in this process is humus. This substance is intimately associated with all the changes which take place in soils, changes which may be roughly grouped under three heads, viz.: Chemical, physical and bio-

logic. Thus it will be seen that its value is not to be underestimated.

Humus contains a large proportion of nitrogen, the amount varying any where from about four to ten or twelve per cent. of its substance. Hence it must be regarded as a very important source of nitrogen, the most costly and at the same time the most easily dissipated of all the substances which enter into the composition of plants. But it has been found that ordinary soils provided with an average amount of humus are also rich in the other important plant foods, phosphorus and potash. It would appear from this that the amount of humus present in a soil may be in a large measure taken as an index to its fertility.

The influence exerted by the presence of humus in a soil is to increase its water-holding capacity and consequently its power to retain different plant foods in solution. This is one of the most important uses from the view-point of the Florida orange grower. In addition to this its presence makes a soil more open and in a measure warmer.

The relationship of micro-organisms or bacteria to the fertility of a soil has already been touched upon and was ably presented to this Society a year ago by Professor Miller. For this reason we shall not deal at any great length with this phase of the subject. Suffice it to say, that when these are absent from a soil it is poor and infertile, and one might as well try to cultivate citrus trees in water cultures as to grow them in a dead soil. Humus is necessary for the growth and activity of these organisms; nothing else will take its place and if it be lacking, the laboratory in which they do their work is taken away and the products formed through their activity are not readily provided. If they be supplied in other ways, they leach readily from the soil, there is no humus there to hold them and satisfactory results cannot be secured.

From these few remarks it will be seen that humus is an exceedingly important soil constituent, and since our soils are usually deficient in this substance, every effort should be made to increase and maintain the supply.

How May Humus be Supplied.

Few of our citrus soils contain a sufficient amount, and if they do in a virgin state, they soon part with it under cultivation in our climate. For this reason steps must be taken to keep up the supply. One of several plans may be adopted: By mulching with native growth and leaves, by allowing native vegetation to spring up and die down; by planting cover crops, or by combination of these methods.

If the mulching system be adopted, large quantities of oak scrub, saw palmetto leaves and other native growth should be cut down, and this together with the rakings from the surface should be thickly scattered over the surface. This covering must be replaced from time to time as it decays. In this way the ground is shaded, evaporation is prevented and a supply of material from which humus may be formed is provided.

The method of allowing the native vegetation to spring up and cover the ground throughout the whole season may be pursued on low hammock soil if plenty of moisture is present, but it must be borne in mind that a dense growth of weeds and grass will pump enormous quantities of moisture from the soil. Herein lies the danger of the method,

for if it be followed on soil naturally deficient in moisture, there will not be enough for both trees and weeds. This difficulty may be obviated in a large measure by cutting the weeds from time to time, but even then caution must be exercised. Bear in mind that the conservation of moisture during late winter and early spring is the all important desideratum on most soils. This method of allowing native growth to cover the ground may be made to give satisfactory results by following the plan touched upon under cover crops. On the other hand it may even be essential to get rid of a superabundance of moisture in the soil, in which case a growth of weeds may do a very desirable work and frequent cultivation for the conservation of moisture would be undesirable.

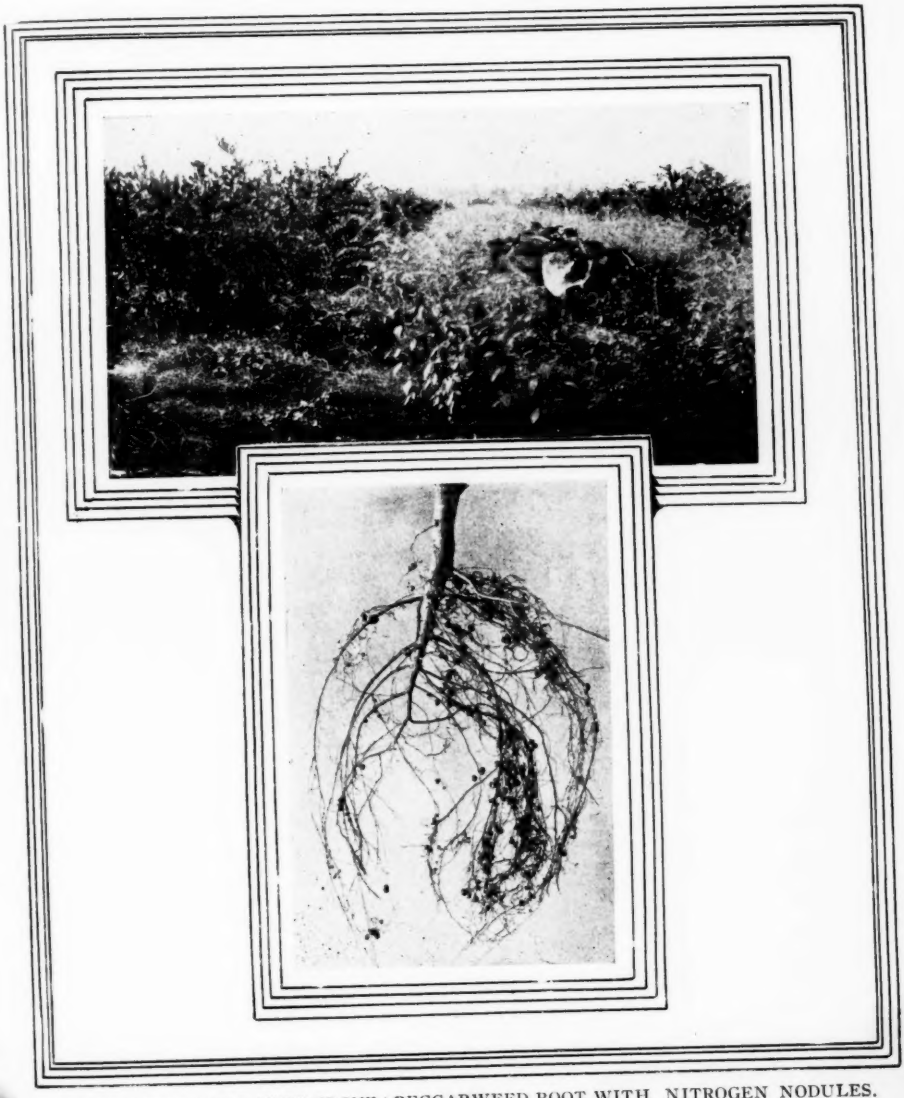
The providing of shade and humus by means of a cover crop is done by large numbers of our growers. The method is best adapted to higher lands or in general to those which do not contain a superabundance of moisture. The growing of a cover crop is always combined with cultivation. Two plans may be adopted and both seem to give good satisfaction under some conditions, but the choice between them must depend upon the amount of water present in the soil. First, clean cultivation from early spring until the beginning of the rainy season, when a cover crop is allowed to have possession; and, second, clean cultivation in a part of the space between the tree rows until the rainy season, with a cover crop growing on the remainder of the space even from the commencement of cultivation in spring and which is allowed to take possession of the whole spaces after cultivation is discontinued. By these methods moisture is conserved when needed and the cover crop helps to reduce the amount during the rainy season.

Of Cover Crops.

The choice of cover crops really lies between beggarweed and the velvet bean. In general we prefer and recommend the former because if rightly handled only one seeding is necessary and cultivation may be carried on until the rainy season and then the crop will appear. It does not require watching to keep it off the trees, though this is not a very strong argument against the velvet bean. But cover crops require careful attention, else die-back may appear in the grove; and in guarding against this beggarweed is to be preferred as it may be cut and removed at any time, thus lessening the amount of nitrogen. It is not quite so easy to manage the velvet bean. To go into all the details of the cover crop question would take more time and space than we feel we have at our disposal. If properly managed, either one will give good results, nitrogen bills will be saved and they leave the ground in when given the space they would get in a grove of small or medium sized trees, excellent condition. Either crop will, supply from seventy-five to a hundred pounds of nitrogen per acre. It might be noted in passing, that so far as our investigations show, beggarweed is the only leguminous cover crop suitable for Florida which is not subject to root-knot. No variety of cowpea is exempt and the velvet bean is attacked slightly. Because of this fact we feel safe in recommending beggarweed as a cover crop for peach orchards.

Time and Method of Cultivation.

To sum up what has already been said,



BEGGARWEED IN ORANGE GROVE; BEGGARWEED ROOT WITH NITROGEN NODULES.

low, wet soils should receive a minimum of cultivation unless the climate or other conditions indicate otherwise. It is best not to cultivate them but to provide a mulch and allow the native growth to cover the ground, cutting it down from time to time. Cultivate drier soil from the commencement of growth until the rainy season sets in. Frequent shallow cultivation should be given during the dry weather, say once a week or every ten days, and if possible after each shower.

In regard to the depth of cultivation it may be said that generally it should be shallow. Plowing frequently does harm by breaking large roots and causing the rapid formation of new ones, which sometimes gather larger amounts of nitrogen than the assimilative organs of the tree can care for and die-back results. But if the trees are deep-rooted and have been plowed from the first the danger is not so great. The light soils can be kept in good condition without plowing. But plowing should be done only when the trees are dormant.

Implements.

One of the best implements for shallow cultivation is the Acme harrow. If to this we add a Planet Jr. Cultivator, a good weeder and a cutaway harrow, we have about all that is necessary.

In conclusion it may be said that the grower, prospective or otherwise, must study his own conditions and decide upon what policy to pursue; and in the light of this it is hoped that the foregoing remarks may be of some assistance.

DISCUSSION.

Mr. Muirhead—Would it be in order to discuss the paper of Professor Hume? There is one exception I would take to it. Professor Hume recommends that in regard to root-knot beggarweed be used, as beggarweed is not subject to root-knot. It does not seem to be generally known that is one of the worst plants for root-knot, and I think it a mistake that the report of the State Horticultural Society should go out without noticing that.

Professor Rolfs—I have never seen a single sample of beggarweed attacked by root-knot.

Mr. Carroll—I would like to ask that gentleman where he found that beggarweed. I have been all over Alachua, Levy and other counties. There was in that section more beggarweed than I have ever seen elsewhere in Florida, and this is the first time I have ever heard of root-knot on beggarweed.

Mr. Muirhead—In my part of Pasco county it is very common.

[The Secretary will add that Mr. Muirhead sent him some samples of beggarweed after he went home, which were at once forwarded to Professor Hume. The Professor replied in part as follows:]

I made the statement in good faith. Beggarweed is not attacked by root-knot (Heterodera radicicola) so far as I have ever observed, and I have planted it in soil that is simply polluted with it. Now, the roots of beggarweed are covered with nitrogen tubercles or nodules caused by the nitrogen-collecting bacterium. These were present on specimens sent you by Mr. Muirhead, but there was no root-knot as I have specimens still and have re-examined them. On this point I am positive. Furthermore, I may repeat that, so far as I am aware, the beggarweed is the only legume of importance for soiling in

Florida that is exempt from its attacks. The Iron cowpea brought out by the Agricultural Department through Messrs. Orton and Webber has not proved immune with me. Velvet bean is slightly attacked.

Protection of Orange Groves.

By E. O. Painter, of the Committee.

(Mr. Painter presented this report with an accompaniment of stereoscopic views projected on slides by a dark lantern. This will explain the references to photographs which occur in places.—Secretary.)

I have visited most of the protected orange groves in the State, and find a variety of sheds, some of which are rather unique, others quite expensive, but all more or less still a question of experiment, as the trees have not yet had sufficient time to show whether they would adapt themselves to the new conditions or not and produce fruit in paying quantities. The experiment, however, has gone far enough to show that the grade of fruit produced in the shed is much finer than that raised in the open. The fruit can also be kept on the trees until late in the season, without damage or loss from cold; and in some sections the saving from loss by thieving is no small item, as in the shed the doors can be locked and the tramp and pilfering winter tourist can thus be kept out, unless they attempt to scale a wall eighteen to twenty feet high.

The first sheds to be built in the State were those of Mr. John B. Stetson. He now has about thirty or forty acres covered. Mr. Stetson has used different methods of covering, such as the hinged shutter, the continuous roll of woven veneer and the panel. All of the covering is being discarded for the panels, as these can be spread out quickly, and when not in use are piled in tiers on top of the shed, and in this way giving two-thirds light and one-third shade. Mr. Stetson's experiment so far has turned out sufficiently satisfactory, so that he is continuing to increase the size of the shed and adopting the panel cover to all.

The accounts of groves which follow were written by the owners themselves in letters to me.

The Wilmshurst Grove.

The above picture shows a grove of 144 trees covered by a shed seventeen feet high. This shed has been built two years, and at the time it was built, the trees were down to the banks. The fruit this year amounted to about eighty boxes. The tangerines were a month later than outside, and a beautiful color. This shed in the summer time is almost as light as it is in the open. The top, as shown in the picture, is stacked for the summer. In the winter the top is covered entirely with the panels when there is a cold wave on, but when the cold is over, every other panel is lifted, thereby making the shed quite light as too much shade in a shed is detrimental to the proper growth of the

trees. It is heated by twenty-four small steel cylinders, while never more than eight have been used at a time, as it is very easy to raise the temperature ten degrees by the use of these eight, in which charcoal is burned, and also wood.—H. J .Wilmshurst.

In conversation with Mr. Wilmshurst, he stated that his grapefruit this year, under shed, had paid him handsomely; in fact, that the revenue was equal to sixty per cent. on the investment.

The Mead Grove at Oyeido.

The cloth is twelve feet above the ground, and has now been made moveable by ropes and pulleys, so as to let in the sunlight whenever it is not too cold.

The trees are planted 5x20, the intention being that each row shall be practically one tree 250 feet long. Have used 10,000 pounds of fertilizer on one acre in the past two years, using one pound per month to each tree till signs of dieback appeared. Have put on no fertilizer since last June. Prior to that, had used only Simon Pure Dieback for some months, and the trees have mostly recovered. I have had some good fruit, mostly grape fruit, each year, including the first year the trees were planted. The trees are 250 tangerines 125 grape fruit and eighty-four Ruby Blood orange, making 495 trees to the acre.

The shed is irrigated and warmed by sulphur water from a deep six-inch well, and supplied by a powerful steam pump. Hydrants forty feet apart each way, each with a spray nozzle covering a circle forty feet in diameter nearly cover the ground, like rain, and in cold nights keep the shed as warm as can be desired, the temperature of the water being always at seventy degrees. When the thermometer outside stood at eighteen degrees for several hours, the temperature inside ranged from forty-eight to fifty degrees, with a dense vaporous fog that acted like a blanket. When the cloth is open, the spray keeps off frost only where it actually falls. The capacity of my pump is 300 gallons per minute, which is enough to keep frost out of a good many acres, if covered in. In summer the cloth is taken off and stored away. It is absolutely necessary to have it moveable in winter, otherwise the fruit is watery and tasteless and the trees fail to bloom properly in the spring. The sides are of 1x8 lumber put on clapboard wise. The cost of the structure itself, including cloth and labor, was $1,200 and it covers 1 1-10 acres.—Theodore L. Mead.

The Swift Grove at Pomona.

So far the shed has proved to be a success. A shed will easily pay for itself in a comparatively short time on the poorest pine land. The shedded grove has many advantages that the open grove does not have. The wind cannot get in to blow off the fruit or twist the trees around so as to thorn it. Last spring and summer, during the great drought, the trees in the shed did not suffer at all—not one of the healthy trees even wilted, and none of the fruit either dropped off or was stunted. Down three or four inches the ground was quite moist, while outside you could hardly strike moisture at six inches. I attribute this to the partial shade which the shed afforded. Of course, I cultivated twice a month regularly.

I find that the insects are about the same inside the shed as they are in the open grove.

The trees are easily kept from freezing by means of a few fires which are easily

attended to. Night labor costs but 25c per hour, and one man can keep from twenty to forty fires going. When the shed is closed the temperature is from four to ten degrees higher without any fires than it is outside. In the winter when the trees are dormant, I build fires between twenty-eight and twenty-nine degrees, but in the early spring, when the trees begin to grow, I "fire" up at thirty-two degrees. My shed covers about two and one-half acres, and during a freeze when the temperature outside fell to 17 1-2 degrees, I kept the temperature between 31 and 34 degrees without any trouble and had only ten fires, burning not more than one-quarter of a cord of wood in nine hours and a half.

Some people think that trees will not bear under a shed, but it is a mistake. My trees bore well in the spring of 1902, and I fertilized them last fall for fruit, and this spring they are bearing as heavy as they can. My trees look fine and are free from disease. The shed is a wood top one, and opens and shuts by means of doors thirty-two inches by seven feet, which are fastened to stationary walk-ways twenty-eight inches wide. Two rows of doors are fastened to one walk-way and constitute little more than two-thirds of the top. The doors are fastened by means of wire loops hooked over nails and can be readily taken down. Part of the sides of my shed are made of veneer panels four feet wide and part of one-inch boards. The panels and boards are set in racks so they can be readily taken down and put up without nails. In my opinion, the panels are far superior to the boards as they make a tighter wall and are much easier and quicker handled. The cost of taking down the sides and doors and putting them up again is about $40 per year.—Franklin Swift, per Henry J. Barber.

The Haw Creek Grove at Crescent City.

The covered shed of this company was constructed during the fall of 1901, but was not finished on account of the wet weather, in time to entirely protect the young trees from the severe cold of December of that year. On about half of the grove the frame work was up and material scattered about, and this slight protection sufficed to preserve the trees from the injurious effects of the cold, while the other or east half being without any protection whatever, was cut by the frost so as to be set back about a year behind the west half. The trees were young buds set out in the summer and fall of 1900, all Tangerines. The present structure covers a little less than ten acres, about 650 feet square. It is surrounded by a wall sixteen feet high, with posts supporting the overhead structure placed 12 1-2x17 feet apart. The overhead covering is cotton cloth, Osnaburg, treated after a process of our own to preserve it from mildew. We use sheet iron stoves in which we burn coke to raise the temperature in severe cold, about 125 to the ten acres, but think we should use more. Each strip of canvas is pulled by itself one-half across the grove. We design however, to pull two strips all across the grove at one pull. At present one pull of twelve and one-half feet covers a space of seventeen feet wide by 325 feet long, and it takes about two and a half hours to cover the whole grove. The condition of the trees under the shed, so far as our experience goes, is perfectly normal and healthy. The trees untouched by the cold have made an astonishing growth and give fine promise for fruit. Last fall's crop

was forty boxes. This year we anticipate a crop of 400 to 500 boxes, mostly from the west half. Of course it is too early to estimate profits from the venture, but we believe we can grow and protect the fruit successfully if the market will continue favorable. We have an additional ten acres which we expect to cover in a year or two, as soon as the trees are a little large, protecting them in the meantime with fires and banking.—Thos H. Stryker, Sec.

The Wetumpka Grove at Hastings.

You ask in regard to cost of shed. As you know, we have the Rollins patent, board wall and cloth top. It has cost us more than I think it can be done for again, from the fact we were inexperienced to start with, and ruined one set of cloth by running it through parafine wax. It seemed to take the life out of the cloth. It has cost about $1,200 per acre, besides the cloth that was ruined. Our trees when we put the shed up were 20x25 feet apart, but a year ago this spring we doubled the number, making about 160 trees to the acre. The last trees set are of the Tardiff variety, and have made a very satisfactory growth. Many of them have twenty-five to fifty fruits on them now. Last year our trees bore very shy, and I laid it to the treatment, viz: no fertilizer, for fear of bringing on dieback. Some of the trees were showing symptoms of it, but last fall they were healthy; so I put on the following mixture, five pounds per tree: Seven hundred pounds boneblack and 400 pounds H. G. sulphate potash on half an acre. On balance of the shed, three and a half acres, I used your Special Simon Pure. The grove today is in perfect health and has set fruit plentifully. I am satisfied the trees can be kept healthy and free from scale and see no reason why they will not bear as heavy crops as they used to outside of protection.

We have the shed arranged now so that we can cover one acre at a time, and can do it in seven or eight minutes. It is the most satisfactory cover I have seen.—G. W. Leonard.

We find the orange trees in about as good condition at Hastings as 100 to 150 miles farther south. The orange trees in the open seem to be doing about as well as the trees in the shed—equally so. I was quite surprised to find that last winter even the tender shoots on the young grove of Mr. Hodges had not been touched by the cold.

Covered Grove at Citra

[In a letter to Mr. Painter, J. A. Stevens, superintendent, minutely describes the shed built over the Clifford grove. The roof was of hinged shutters, opening downward. These interfered with the growing trees. He also says: "The frame work in settling gets out of plumb and the squares are not true and the shutters bind in closing and will not close up tight. So now we are altering this plan of cover." The new and better plan is in operation on the Barney grove, described below.—Secretary.]

This Barney shed, covering three acres, was originally built on the same plan as the Clifford shed, but because of the difficulties of operating that style of cover, as enumerated in my letter describing the Clifford shed, this has been made over. The framework of this shed divides the area covered into squares of twelve and a half feet each, and where two swinging shutters of 6x12 feet each originally filled the square, these two swinging shutters have been made over into three

panels of 4x12 feet each. One of these panels is put down stationary, and four rafters are put up over it, two at each end, to support the other two panels, which, when open, are raised up and leaned against the rafters toward each other and form a roof over the lower or stationary panel.

When the cover is open in this way two thirds of the cover is open, one-third is always closed. When closed the two side panels are turned down until they lie flat on the framework and the whole top of the shed is closed snug.

This plan gives the trees both sunshine and shade. The openings in the cover, when open, run east and west. The sun in passing over throws sunshine and also casts a shadow upon the trees below in its day's journey. The trees in this shed are doing well and now have a nice crop of young oranges on them. I could give you numerous experiences we have had with our sheds, but I understand that you are principally interested in the construction of the sheds.

As to the cost of this shed, it would be pretty hard to come at it, as we had to make it over from another style. But I should say that a shed on this plan could be built for $800 per acre.

Trees in this shed are twelve and a half feet apart each way. There are 735 of them; varieties, Pineapple orange, Triumph pomelo and Dancy Tangerine.

Cost of firing is the same per acre as in the Clifford shed. (Four acres $14 per night with wood, $9 with coke.)

This shed is opened and closed by two men walking on top, taking hold of each end of a panel and raising or lowering it as the case may be. It cannot be operated quite as rapidly as the Clifford shutter shed. It takes two men half a day to go over the whole shed. But in the winter we do not open it all at once, except on bright warm days. Every night in winter we have at least half of the cover down, so as to be able to close the rest quickly if it should be necessary.—J. A. Stevens.

Mr. W. S. Hart of Hawks Park, was among the first to experiment with a shedded grove. He used for covering woven lath, which gave about half shade. His report of the experiment was very satisfactory during the first one or two years, but he found that cultivating a grove under a shed and cultivating one in the open were entirely different things. The growth made at first under the shed was considerably more than that of similar trees on the outside. The final results, however, were that Mr. Hart found it advisable to remove the cover to let in the sun and air, as he believed he would get better results in the end by so doing.

Tent Protection---Open Fires

The tent protection craze had its day, like many others, and now is comparatively a thing of the past, although my own personal experience at DeLand is such that it leads me to say it would pay to protect young trees by tents. In my own groves the trees that I protected for two years by tents are now large, beautiful trees, and last year gave me a good crop of fruit, while other trees in the grove that were not protected other than by banking, have been frozen back to the bank every winter, so that at the present time the tops are no larger than they were the first year following the freeze. If one intends making an orange grove in the latitude of DeLand, on open pine land, it would pay him to invest in tents and lamps for protecting the trees until after they are three years old. Orange wood that is three years old

seems to be able to withstand any of the ordinary freezes that visit our State. By using the box or square form of tent, the cost need not exceed $2 per tree. If the tents are taken care of properly during the summer and put away so that they will not mildew, they can be used for four or five years. The great trouble with the average grower is that when his material is put away in the spring it is not put away properly, consequently it receives as much damage during the summer months when in store as it does in the open during the winter.

In the southern part of the State, from Orlando down, the protection has mainly been open fires in the groves, and it has proven to be very satisfactory. Wherever the groves were fired during cold nights, the foliage was saved and the bloom also. One of the greatest benefits to be derived from firing is the drying up of the dew, as the radiation is prevented and the tender growth does not suffer. This fact is clearly demonstrated by the splendid manner in which the orange tree that is overhung with some other tree goes through a cold snap. The tree on which no dew has fallen will stand without injury several degrees more cold than one on which dew has accumulated. In several instances I have seen very nice trees protected simply by an over-head framework that kept the dew from the foliage.

Various Forms of Protection

At Mr. S. C. Warner's, at Esperando, I saw a variety of tree protectors for the open ground. In the first place, he had nearly all of his trees protected by a high board wall in the shape of a triangle erected on the northwest side of the tree. In front of the tree he had placed coal baskets well filled with coal, ready to light at a moment's warning. The protection over Mr. Warner's trees seemed to be ample, as they were certainly doing well and carrying a fine crop of fruit.

Messrs. C. S. Brown & Company have a grove only a short distance from Mr. Warner's that is protected with oil pots of their own designing, This oil pot is simply a cylinder containing about one inch thickness of asbestos packing on the inside. This cylinder is placed in a large pan in which crude oil is placed. On the approach of dangerous cold the oil is ignited on the inside of the cylinder, the asbestos acting as a wick. This seems to be an ideal plan for oil protection, as it is easily handled and a very large number of fires can be controlled by one man. The principal difficulty seems to be in the way of getting the crude oil. When the Beaumont oil well was discovered, it was supposed there would be no trouble in getting all the oil required for any and all purposes, at a low rate. The increased consumption of crude oil has been so great that even with the flood of oil produced at Beaumont, it is sometimes difficult to get any large quantity of crude oil. I would suggest that anyone contemplating protecting his grove by this method should first ascertain whether or not he can get the required amount of oil.

The Lubrecht Shed at Island Grove.

Mr. Lubrecht, of Island Grove, was among the first to build a shed. The cover of his shed was made on the plan of a wooden shutter or blind. Boards ten inches wide were set up on edges and connected together on top, so that on the approach of cold weather it was a very simple matter to close it up quickly. Mr. Lubrecht's method does not seem to have proven satisfactory as will be shown by the

following letter recently received from him.

In reply to your letter of the 28th, will say that since March 1, I have had all the boards taken off the orange shed. There are only posts, runners and walls left, so I could not take a phôto that would give any satisfaction. So far, the shed has not been a success. The trees are large and are growing well but I get no fruit, or what little fruit I get is not so good in flavor as from trees outside. Next winter I will protect the trees again, but in the following way: The first row of trees on the north of the shed I will cover with boards, so that the winter sun can get to the trees underneath; then I will go seventy-five feet farther south and build another wall east and west. I will use the boards from the roof, as they are just the right length. All I will need to do is to drive a nail every ten inches in the posts, and hang the boards on them, as the boards have just the right bevel. On the south side of this wall I will cover the first row of trees again with boards. Now this is the way I am going to protect the trees; every three rows one wall on, and the row of trees near the wall covered with boards. Every twenty-five feet I will have a fire place, and believe I will get the trees through, even if it goes again to nine degrees above. —Herm. Lubrecht.

Fertilizing---Banking---Stocks.

It has been discovered that the orange tree under a shed requires considerably less fertilizer than in the open, and the fertilizer should contain not over half as much ammonia as is used outside. Trees that were highly fertilized when placed under shed were soon troubled with dieback, so that it was necessary to leave out ammonia from the fertilizer entirely. Fertilizer for the shedded grove should not contain over two per cent of ammonia, with about thirteen per cent actual potash, and six to eight per cent available phosphoric acid.

Nearly everyone in the frozen out section banked all his young trees above the bud during the winter months. The advisability of doing this has several times been quite severely criticised. There is no question about it being the proper thing to do for young trees, for if they are budded low, the bank can be carried above the bud so that in case of severe cold it will not be necessary to re-bud the same tree in the spring. This protection, like that of the tent, is only necessary during the first two or three years' growth. I find that as soon as a tree has gained sufficient age so as to thoroughly mature its wood it is not very often affected seriously by the cold weather we have during the winter. In fact, if we are to have cold spells that kill to the ground trees that are three years old, that section had better go into some other business than attempting to raise oranges.

President Taber has been able to raise the Satsuma profitably in the northern part of Baker county with open fires. The Satsuma worked on trifoliata stock is considered more hardy than others of the citrus fruits, and on the heavy soil in the northern part of the State the trifoliata does remarkably well.

In this connection, I would say that the question of the advisability of protecting orange trees with sheds as a source of profit has not yet been fully demonstrated. Some of the growers feel confident that their method of handling their groves is the best plan and is sure to prove profitable, while others are still in doubt as to the final outcome, but are sufficiently in-

terested in the growth and development of the orange industry to experiment to the extent of expending several thousand dollars in putting up sheds. The ultimate success, however, depends to a great extent on the weather. If we should have a succession of winters such as we have had in years gone by, the outside grove will be the one to realize the money from, but should we again have our hopes blasted by the cold air from the northwest, the one who has his shed well built, well fired and well taken care of will be the one to realize handsomely on the investment.

Report on Strawberries.

By S. Powers, of the Committee.

The strawberry industry has shared in the depression produced by the unfavorable climatic influences which have affected nearly all the crops of the State. An abundant precipitation in the fall of 1902 enabled the growers to plant a wide acreage and to secure an almost perfect stand.

If the rainfall had thereafter been confined to the seasonal normal, the strawberry output would have been very large and of a superior quality.

But instead of that, it continued to rain and as the season advanced there was harder rain and more frequent; and the plants began to suffer, especially since the strawberry is usually planted on low, moist ground. Wherever there was any clay or humus in the soil it became sodden and compacted.

The strawberry is comparatively a weak feeder and it feeds close at home. It is advisable generally to close cultivation when the blooming activity begins, at which time or a little before the mulching is applied. The downpour still persisted, and the plants were now imprisoned in a hardened soil and further confined by the mulching. A few planters removed the mulching, cultivated and replaced it, only to see it rain some more. A few went along the rows with a prong-hoe, struck it deep down under each hill and carefully pried it up a little.

The result of this excessive rainfall was that the plants made very little, if any, spring growth, which usually adds a second story, serving as a roof to protect the berries from the frost. Lacking their customary protection, the berries were more easily touched by late frosts. They were sodden and rotted by the rain, the pollen was beaten out and the percentage of fertilization diminished. On lands naturally or artificially well-drained, however, the production was large, as the great number of blossoms formed more than compensated for the washing away of the pollen.

In sporadic cases the thrips appeared; in one instance, in Clay county, a correspondent reports a loss of seventy-five per cent, from the ravages of this insect, which is usually most troublesome in rainy seasons.

Neither did the growers have the compensating advantage of the tomato growers, in receiving an enchanced

price for the proportion of the crop which was left. The berries were soft from an excessive percentage of moisture; they did not ship well; they went down soon after their arrival on the markets and even in instances while still under refrigeration. The prices suffered. In Lawtey, for instance the growers received normally good prices only one week where they usually have them for a month or more. They netted only about $2.50 a crate, while last year they netted between $4.50 and $5.00.

At my request C. H. Churchill of Lawtey gave me the following notes on new varieties tested there:

Duff (P), shipping, medium size, long conical, bright red, good quality, medium firm but a good shipper, medium early,, healthy strong grower, very productive.

Klondike (S.), best shipper, all purposes, average large size, heart-shaped, dark red, quality best, firm, good shipper, medium early, extra strong grower, extra heavy yielder.

Lady Thompson (S.), shipping, medium to large, broad conical, color from pale pink to bright red, quality good, flesh medium firm, midseason, vigorous grower, heavy yielder.

Mr. R. K. Muirhead of Pasadena also contributed the following notes:

Statement by R. K. Muirhead.

Mr. S. Powers. Dear Sir:—Enclosed I send you a few notes on what plants we have grown this last year. We have tested hundreds of different varieties from California, New York, Maryland, England, etc., and found the seven varieties I have written about by far the best for our part of Florida.

Our strawberry land is of several different kinds—low, wet hammock (bayhead) rising into pine hills thirty to forty feet high. They have all, however, a clay subsoil, and although quite dry on the surface have moisture underneath; and all our land has a decided fall, that is our strawberry land. The low land we have ditched so that we can run the water off if too wet, and also stop the ditches so as to retain all the moisture when too dry; also we can lead water over some of the drier portions.

Strawberries.

Brandywine.—I think the Brandywine heads the list of all the different varieties grown in Florida. It is very much larger than any other variety; we have filled a quart basket with 17-18-19 berries on the same day. The flavor is excellent; it is of a beautiful crimson color with large, dark-green cap. This season we picked nearly 600 quarts off one acre in three pickings in one week, Monday, Wednesday and Friday. It is, however, very liable to rust or leaf-blight, and requires to be sprayed very thoroughly with Bordeaux mixture. It is a staminate and a very heavy pollenizer, and is recommended to be used to pollenize pistillate varieties. It, however, requires a special quality of land; we have found it to do well only on dark, sandy loam with clay subsoil and moderately moist.

Excelsior (S.).—Our next favorite is the Excelsior. This is the earliest of all the strawberries grown here, and bears more heavily than all other varieties. This season we picked nearly 3,000 quarts from one acre and now a second crop is coming on too late to ship.

This variety requires to be manured very heavily and several times, at least

three applications. Its bad feature is that it sets too many small berries that worry both the pickers and the packers.

Lady Thompson (S.).—Comes third on the list, is also an early berry and a heavy cropper. Good flavor and large size, but is pale in color and soft, so it does not ship well except on ice.

Klondyke (S.).—Is also a splendid berry, but has not been long enough with us to gain a decided character.

Hoffman.—Is far too shy a bearer to pay the grower. It is, however, a splendid shipper, large in size, good flavor, fine color and brings the top price in markets.

Early Michel (S.)—Early Michel is by far the best variety for dry land and in a dry season it cannot be surpassed. It has the best flavor of all the berries mentioned. We would recommend it as the best variety for home use. It is rather too soft to ship except on ice early in the season.

Newnan, (S.)—The Improved Newnan is the old Florida standby and in some seasons pays better than some of the newer varieties.

Imported plants do not do well the first season they are planted, so all growers should get Florida-grown plants if at all possible.

Dewberries.

We have tried both the Austin and the Lucretia dewberries and have no hesitation in recommending the native dewberry as far superior. If cultivated it is much earlier than those and quite as large and more prolific.

Mulberries.

We have two varieties—the Downing, which blooms very early and is usually caught by Jack Frost; and another which blooms late and always has a heavy crop and ripens its fruit in June and July. We have no name for it. My son says it is called Everbearing because it bears nearly all summer.

New Fruits for Florida.

By E. N. Reasoner, of the Committee.

Not heretofore in our official catalogue, but now sufficiently tried to warrant being listed and classified, are the following fruit trees and plants:

Rubus trivialis, the Manatee dewberry, which has found a welcome in Texas and far away India. This bears an abundance of black berries of a melting, luscious quality fit for any table or market. The fruit is improved by keeping cool for at least a day after picking.

Rubus ————?. The Northey berry, supposed to be a hybrid dewberry-blackberry, from Lake County, Florida. The fruit was shown and described by Prof. Rolfs at our meeting in Orlando in 1898. Color, wine-red; size, medium to large; quality soft and delicious, of a delicate raspberry flavor, richly sub-acid; far ahead of any rubus yet grown in South Florida. The habit of the vine in growth and fruiting is similar to the dewberry,

and it is very proific. The berries are very tender like strawberries, having small seeds, and would require icing during distant shipment, but it is a delicious fruit to eat at home. As Prof. Hume reminds us, we want something to eat ourselves.

Myrtus tomentosus, the downy myrtle of India. About as hardy as the Cattley guava; a handsome shrub, evergreen, bearing a profusion of pretty pink flowers followed by purplish berries about three-quarters of an inch long, sweet and meaty.

Opuntia Tuna, the tuna cactus of Mexico, a large-growing "prickly-pear," the leaves and fruit of which are so valuable for feeding stock in arid regions. It is hardy throughout Florida and bears continuously large purple fruits containing a highy colored juice valuable for coloring jellies, cakes, etc.

Opuntia ficus-Indica, the Indian fig cactus from the West Indies. This makes an immense plant often ten feet high and bears quantities of lemon colored fruits two or three inches long, of a sub-acid flavor. This cactus is spineless, or nearly so, and is common along the west coast of South Florida on many old homesteads. Will stand much frost.

Pineapples—Green and Red Ceylon, two sorts introduced by an East Coast grower about five years ago. Quality, excellent, and winter-bearing; said to excel the Smooth Cayenne, while the color of the red variety is very atractive

Bananas,—Dacca, very valuable dwarf sort; quality somewhat like Hart's Choice, but with bunches smaller, and individual fruits larger. It scarcely ever attains a height of seven feet, hence valuable in many restricted locations, as a pinery or conservatory. Martinique, the ordinary commercial banana so largely shipped from the West Indies. This is a tall grower and quite tender, only fit to be planted in the most favorable places in the extreme southern part of Florida.

Guavas.—Psidium molle, the "sour guisaro" of Costa Rica, has been found to be a valuable acid variety especially suitable for jelly-making. The fruits are of medium size, very prolific, and are borne in from two to four crops per year. Calcutta Apple Guava, another sour guava with a decided apple fragrance and high value for jelly-making. Guinea (P. Guineense) a large guava with very thick meat and few seeds. It is both pink and white fruited, of excelent flavor; a delicious fruit for dessert and good for canning being so large and sweet.

Mangoes.—Mulgoba, introduced from India by the Department of Agriculture at Washington, and now being rapidly propagated and disseminated over South Florida. The Indian mangoes are noted for their splendid quality, size and freedom from fibre; this variety has proved to be a great object-lesson to growers of common seedling mangoes, who now realize the immense possibilities which lie in marketing so delicious a fruit in all American cities. There are a number of other Indian varieties being introduced and tried, and in time we shall have the finest sorts here. Long or Bishop mango, a very good West Indian sort introduced from Jamaica, but of varying quality; size large, often weighing fifteen ounces; flavor excellent; fibre only medium.

Carissa arduina, the Maritzgula or Amatungula of Natal, South Africa. A spiny shrub, evergreen, standing considerable frost and bearing scarlet berries, about one and a half inches long by three-quar-

ters of an inch in diameter, tasting not unlike red raspberries. This is a useful plant for hedges.

Casimiroa edulis, the sapota blanco of Mexico. A large tree, bearing fruits the size of a mandarin orange of a peach-like flavor.

Aberia Caffra, the Kei-apple of Natal. The bush may be used for hedges or grown in a limited area. The rather large fruits are useful for preserving.

Anacardium occidentale, cashew apple and nut. A large spreading bush or small tree, bearing white, red or yellow fruits of large size (three or four inches long). The juice is sub-acid and the seed which is borne prominently at the end and outside of the fruit, may be roasted and eaten like a chestnut.

Cupania sapida, the akee of West Africa, now naturalized in Jamaica and other islands of the West Indies. A tall tree bearing rich, red fruit, poisonous when eaten raw, but wholesome when cooked, which are largely used in the West Indies as a regular article of diet.

Passiflora quadrangularis, one of the granadilla vines, from Central America. This is the largest-fruited passiflora and perhaps the most important; the fruits are highly prized in the tropics and grown in many countries. It may be grown on an arbor or as a covering for unsightly fences or out buildings, but will not stand a hard frost.

Lucuma Rivicoa, the egg-fruit or tiessa of Cuba. A tropical tree of small size, bearing sweet rich fruits the size of hens' eggs and like miniature mammee-sapotas. It may be grown where the mango thrives, having fruited so far north as Tampa.

Malpighia glabra. This is the Barbados cherry, a handsome and delicate small fruit, of a pleasant acid flavor, resembling in color the well-known Surinam cherry, but differing in quality and make-up. It is only a shrub, but bears profusely at an early age.

Monstera deliciosa, the famed ceriman of Trinidad. A large-leaved aroid plant of striking beauty, which climbs tree-trunks and walls, and bears large cone-like fruits resembling in flavor a combination of pineapple and banana. It is readily grown under a pinery, or in partial shade anywhere, but is impatient of frost.

Triphasia trifoliata, the Philippine lime-berry, a lowly member of the citrus family, is a small shrub of a spiny nature. It bears small red fruits the size of cherries, rich and excellent when preserved, which fetch a high price in the world's markets being a first-class delicacy. The bushes may be profitably grown in hedges, in spots free from hard frosts.

Sour Rangpur lime, or the mandarin lime of India. The loose rind with its high lobster-red color; extremely acid, well-flavored juice; and hardy nature of the tree, render this a grand acquisition. Many were pleased and delighted at seeing the great limbs thickly filled with fruits, shown at the recent State Fair. The tree is about as hardy as the common sweet orange as regards frost, and fruits prodigiously.

Corsican citron.—This is the real commercial citron, the only sort worth growing, introduced by the Department of Agriculture at Washington, a few years ago, after much labor and expense. Fruits are large, and tree tender like the lime, but may be largely raised in South Florida.

Royal pomelo.—A West Coast product, well described by Prof. H. Harold Hume in his excellent bulletin on pomelos. Fruit

is early ripening, of small to medium size, very rich and sweet; very satisfactory to Floridians.

Pernambuco pomelo.—This has also been described in the bulletin on pomelos by Prof. Hume. Fruits are large, late ripening, and contain the characteristic bitter of the old grape-furit. Holds on the tree very late in the season, and has proved a good market variety, largely in demand.

Oneco Mandarin, last but not least on my list. This is the finest of all Mandarin oranges. (See Prof. Hume's bulletin on Mandarins, for analysis and full description) yet originated. From India, a result of centuries of culture, this has developed with our favorable soil and climate into a delectable fruit "fit for the gods," yet more likely to be fed to American millionaires by our intelligent planters. It has a sweet, delicious flavor wholly its own, little rag, high red color, and is of medium size. The tree has proved exceptionally hardy, standing severe frosts unharmed. The season of ripening is through January, February and March, often holding till April, making it very valuable for market, a time when other Mandarins are scarce.

Remarks on Nut Culture.

By D. L. Pierson, of Monticello.

Mr. President—I would say in reference to Nut Culture that in my section, North Florida, the pecan is being largely planted and the same is true of the States to the north of us. At a meeting of the National Nut Growers' Association, held in Macon, Ga., in October last, which I attended, the interest manifested in the subject of nut growing was great and reports of large plantings of pecan and other nut bearing trees were common.

There seems to be a growing demand for the best varieties of budded and grafted pecan trees. Comparatively few seedling trees are being planted and where these are used it is with the intention of budding or grafting them later, in most cases.

Japan walnuts and chestnuts are being planted to some extent. We are experimenting with the new hybrid chestnuts and are trying such varieties as Paragon, Ridgely, Numbo, Killen, Kent and Coe. They are said to bear very young, in fact, the first year from the graft; so we hope to be able to make a favorable report on them next year. We are also making a trial of the hybrid chinquapin. It is a natural cross between the sweet chestnut and the bush chinquapin and is fully as large as the chestnut; is round like the chinquapin and combines its good qualities of delicate flavor and prolificness. As the chinquapin is indigenous to this section of the country we hope for a valuable addition to our list of nut-bearing trees in this new hybrid.

There is a great deal said in the agricultural papers about bogus budded pecans. It is a hard matter to tell if the

buds and grafts "so-called," are genuine or not. The foliage of the buds and grafts is of a much lighter shade than that of the seedling trees. even though the wood for propagating may have been taken from a seedling tree. You may say if that is true there can be no certainty that, even though the buds and grafts may be genuine, the variety is desirable. That is true so far as my observation goes. It is a very easy matter to "fake" pecan trees, and there is no doubt that many persons have been badly swindled in this way in the past few years in this and other States. It seems strange that intelligent people will allow themselves to be taken in by these traveling fakers while there are so many reliable nurserymen from whom they can get the goods with the full assurance that they will prove to be just as represented.

Keeping Oranges Late.

Mr. Hart—Last year I brought to the meeting a few specimen oranges which had been off the trees nearly four and a half months, and were yet fresh looking, plump and heavy. They certainly had the appearance of having been lately picked from the tree, except that in some instances the color was a little dark. I had in years past, in working my groves away long in late spring or early summer, knocked oranges out from under dead leaves and sand that to me after working in the hot sun seemed almost perfect in juice qualities as well as in appearance. These experiences suggested the plan of keeping them as bud wood is kept by simply laying on the ground in a shady place and covering with sphagnum moss which plan was given me by our worthy president. I had budding wood that had been prepared this way and left out in the weather for many months and was still in perfect condition. I also bore in mind the plan usually followed for keeping potatoes but would lay the oranges in a single layer. The plan then is to lay the oranges on the ground, one layer deep in a shady place, but where the rains will fall on them and cover them lightly with sphagnum moss. I believe that oranges can so be kept in fine shape for our summer use and at no expense except the little work involved.

Business Matters and Resolutions.

Appropriation for World's Fair.

The special committee, through Geo. W. Wilson, reported as follows:

In sympathy with progressive ideas, we feel that Florida should make all the exhibit possible at expositions, but in going into the matter very carefully, the various members of the committee found the impression prevailed that it was impossible to make a creditable exhibit at St. Louis without at least $100,000. Any less than this appropriation would be absolutely worthless when placed alongside other States with their similar products, and it is deemed by those who are aroused as to the development of Florida that it would

be best to use this $100,000 to establish an Immigration Bureau, instead of making an exhibit. The Legislature will not pass an appropriation for $100,000, and it would be folly to accept an appropriation for $50,000, this amount being totally inadequate.

Report adopted.

Agricultural Institute—Horticultural Inspection.

T. A. Carroll introduced a resolution reciting the main features of a bill offered in the Legislature by Mr. Watson of Osceola, to establish an Agricultural Institute and appropriating $5,000 for the erection of buildings and $5,000 a year for the support of the institution; and spoke briefly in its support. It was referred to the Committee on Legislation, consisting of Prof. H. E. Stockbridge, Lake City; W. S. Hart, Hawks Park; Dr. Wm. C. Richardson, Tampa; Geo. W. Wilson, Jacksonville; C. T. McCarty, Eldred.

This committee reported two separate recommendations:

First—It is the sense of this committee that the resolution endorsing the House bill introduced by Mr. Watson of Osceola county to create an Agricultural Institute be referred back to the Society with the recommendation that it do not pass, for the reason that the creation of an institute of this kind will tend to detract from the experimental work and agricultural investigations of the station now under control and operated by the University of Florida. It is the unanimous opinion of the committee that all funds appropriated by the State for experimentation should be concentrated at this point, thereby strengthening its efficiency and broadening its scope so necessary to our agricultural and horticultural interests. If necessary to carry on specific investigation in sections it is best to locate substations for examination.

Second—Your committee specially recommend that a standing committee of this Society be created to consist of seven members, who shall be skilled, experienced and practical horticulturists, the President and Secretary being ex-officio members thereof; said committee to be known as the standing committee on diseases, ininsects, protection and remedies; the duties of which shall be to superintend, direct, govern and control all investigations, experiments and practical field tests, in conformity with, and in affiliation with, the United States Department of Agriculture and the experiment station of the University of Florida; but in no way to conflict with the original and independent investigations to be carried on by these co-ordinate organizations.

We urgently recommend that a law be enacted by the present Legislature that will clothe this committee of the Horticultural Society with such authority and power as will enable a thorough and efficient execution of its work.

The Society to present to the Legislature a petition praying for such a law and to appropriate such funds out of the State Treasury as will cover the annual expenses of this committee in the active prosecution and execution of its important work.

After some debate each of these recommendations was adopted separately by a unanimous vote.

To Teach Forestry,

Introduced by Geo. W. Wilson:

Resolved, By the Florida State Horti-

cultural Society in annual meeting assembled: That the Superintendent of Public Instruction of the State of Florida be urgently requested to inaugurate a system of instruction,both primary and academic, through the various schools and colleges of the State, that will teach the youth ot Florida the great importance and value of forestry and forest protection; the evils arising from forest fires and the serious effect upon climate and production caused by the neglect of the same, thereby creating in the minds of the young and rising generation a public sentiment in opposition to an evil that threatens the prosperity of our State more than any other.

Adopted.

Asking Government Aid.

Introduced by W. S. Hart:

Whereas, The orange growers of Florida are annually suffering the loss of many thousands of dollars in the reduction of their fruit crop and still more in the market value of their groves through a disease known as orange tree blight, which usually selects the largest and most productive trees for attack; and

Whereas, Though the disease has been carefully studied for many years by very able Department experts, it is not yet well enough known to allow of its positive identification, in many cases, before the second or third year after its appearance, while investigations pretty surely prove that the disease is contagious, which makes each diseased tree a nucleus from which it is carried to others when caring for or working the groves; and,

Whereas, Progress has lately been made that encourages the belief that if additional help with special fitness can be sent here and allowed to devote their whole time to assisting in this select work, we have reason to hope that the cause may be determined and a remedy eventually found for it; therefore be it

Resolved, That the Committee on Diseases, Insects, Protection and Remedies, be instructed to correspond with the Florida Representatives in Washington and earnestly request them to call upon the Secretary of Agriculture, Hon. James Wilson, and urge upon him the importance of this work and the pressing need that we feel for further assistance from his Department. Be it further

Resolved, That each member of this Society exert his or her influence as an individual to secure an increased appropriation for this work.

Adopted.

FINAL RESOLUTIONS.

Judge W. L. Palmer—Mr. President, your committee beg to report the following resolutions (given below):

I venture to add to the formal reading of the resolutions a few remarks. Last year through the earnest efforts of the Dade county members, headed by Mr. and Mrs. McCarty, this Society was induced to come to the East Coast for its meeting in 1903. I was pleased to aid in getting you here. Since 1887 I have known the charming hospitality of this people. It was so when they had thatched roofs above their heads. It was in 1887 that I came in capacity of State Attorney with the late Judge E. K. Foster to establish the first State court in Dade county. We were received bv a delegation of thirteen citizens; two white men in their shirt sleeves and eleven Indians almost in their birthday costumes. There was one horse in the county, but no wagon, I be-

lieve. The grand jury cleaned out a floorless room in the old store building across the way, while the judge opened court seated on a goods box in an adjoining room. Where now this city by the sea is built, the vine and tropic growth were undisturbed, and where now flash the electric lights the lightning-bugs swarmed to dimly reveal the way.

We wanted you to see the handiwork of the men and women who have by their energy, grit and push, almost spoken to the rocks and these homes, these farms these groves and other splendid improvements have sprung into existence as if by magic. I know you feel the half had not been told. Truly here is a chosen spot for this Society to come and camp for a season. Now that you have looked upon these scenes, have tested the splendid hospitality of these good people who are ready to go a day's journey with the departing guest, you must feel delighted that the West Coast has clasped hands with the East Coast, while the interior counties applaud approvingly.

Let us hope the work and usefulness of this Society may broaden and extend. Great possibilities are ahead of this State. We have only to go forward to possess real results. When the Panama canal is open through this peninsula shall pass the richest commerce the world has ever seen, and to our markets the people of the world shall come to buy. Let the men and women of the farm and grove and the garden be up and in the front rank of the business world of their Republic to share the golden harvest. Let us trust that Miami shall be second to no part of the State.

I move that the resolutions be adopted by a rising vote.

Resolved, That the special and hearty thanks of the Society are hereby tendered to the people of Miami for the delightful excursion on Biscayne Bay provided by them for our entertainment. This excursion was not only enjoyable but instructive as it carried us out to the fountainhead where this exquisite climate of Miami originates.

Resolved, That the Society hereby expresses its high appreciation of the aid rendered by the railroads of the State in the reduction of fares and the arrangement of schedules.

Resolved, That hearty thanks be tendered Mr. and Mrs. Bush, Dr. and Mrs. Blackman, Mrs. Palmer and Mrs. Hudson for musical renditions given and to Mrs. C .T. McCarty for recitations. Also to Prof. P. H. Rolfs, and Mr. E. O. Painter for the delightful and instructive entertainments they afforded us.

Resolved, That an appreciative recognition is hereby expressed to Hon. Fred S. Morse, Rev. E. V. Blackman and Mr. C. T. McCarty for their earnest labors toward making this a successful meeting.

Geo. Kerr, W. L. Palmer, D. L. Pierson, Committee.

To the Ladies' Committee on Promotion.

Introduced by Dr. Geo. Kerr:

I move that we, the gentlemen of this Society, tender to the ladies our heartfelt thanks for the increase in our membership; that we tender and assure them of our esteem and gratitude here and hereafter, as it has been hinted that we are not supposed to enter the "Gates Ajar."

Adopted.

Necrology.

CAPT. THOMAS E. RICHARDS.

The following obituary was written by a friend and published in the Titusville Star:

Died, at Eden, Fla., of heart failure, on Friday, Oct. 24, 1902, at 8 p. m., Capt. Thomas E. Richards, who was born in Newark, N. J., on June 18, 1830. There his family have always been identified with the best interests of the city, ever since Deacon Thomas Richards bought the land from the Indians, to found the city. The purchase extended from the top of Orange Mountain to the Passaic river.

Captain Richards was born of old Puritan stock, and was the eldest son of Samuel and Lucy Biglow Richards. He was a shipbuilder by trade, which occupation he followed until the fall of 1870, when failing health compelled him to seek a more congenial clime. He came up the St. Johns River to Lake Washington, and had his boat hauled over to the Indian River, and began a search for a home in the then wilderness extending south along the beautiful Indian River. After weeks spent in prospecting for a location, he located 100 miles south of Titusville, and having found it a paradise to his recent northern home, he called it Eden, and he has always been known as the father of Eden.

Through Captain Richards' perseverance and untiring energy, the pineapple industry of the State was brought up to a financial success, to which is due the settlements and prosperity of the East Coast from Fort Pierce to the St. Lucie river. In his loss the county and State have lost one of its best and most valuable citizens, and the Congregational church one of its oldest and honored members, also its deacon. The Masonic Lodge one of its valued members and brothers, and the neighborhood its oldest and best friend and neighbor. None ever went to Captain Richards for a favor that he turned away empty handed.

For the past three months he has borne his sufferings without a murmur or complaint, and during all this time he has had to remain sitting in a chair waiting for the summons from his Master, yet he has not complained, but said he was awaiting his Master's call and ready to obey his orders. Everything was done for him that medical skill and loving hands could do to make his last days as pleasant as it was possible, and the end came as peaceful and quiet, in the midst of his family and friends.

The deceased leaves a wife, two sons, and one daughter, also one daughter-in-law, all married and living in the immediate vicinity, who have the heartfelt sympathy of the entire community in this their sad loss of a kind husband and father.

Funeral services were held at his late residence at 2 o'clock p. m., the 25th inst., Rev. Weatherwax of Melbourne, who is also pastor of the Eden Congregational church, officiating. After which his body

was taken charge of and buried by the Masons, in a downpour of rain.

Time has laid his hand
Upon my heart, gently, not smiting it,
But as a harper lays his open palm
Upon his harp, to deaden its vibrations.

CAPT. JOHN J. HADEN.

Captain John January Haden was born in Howard county, Mo., May 9, 1856, and died of malarial jaundice Jaunary 30, 1903, at Cocoanut Grove, Fla.

When he was eleven years old his parents went to Texas and settled near Corsicana, where he received his early education. In 1873 he received the appointment to West Point from his district, and graduated near the head of his class in 1877. He chose the infantry branch of the service and was promoted to be Second Lieutenant of the 8th U. S. Infantry, June 15, 1877. His service was mostly on the frontier in the West where he served at various army posts and took active part in several Indian campaigns. In 1896 he was retired from active service on account of serious eye trouble contracted in the West and came to Florida to seek relief. He settled at Cocoanut Grove, where he was one of the most active and enthusiastic fruit growers, and was interested in all public work that looked toward the improvement of the country and the benefit of the people.

He was a life member of the Florida State Horticultural Society, and one of its warmest friends.

FLORENCE P. HADEN.

MAJ. H. J. TIFFIN.

Major H. J. Tiffin was a life member of the Society, who came from Canada and bought an orange grove at Courtenay, which he developed into a handsome property. He kept a flock of ostriches and a pack of buckhounds, and dispensed the generous hospitality of an English country gentleman.

The secretary addressed letters to his former neighbors and to his estate in Montreal, but could learn no particulars beyond the fact of his death

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J. R. LYMAN.

John Rudolph Lyman was born at Newton Falls, Ohio, June 25, 1864. In 1885 he left Hiram College where he was taking a course of study, and came to Florida, and he spent the remaining seventeen years of his life in the town of Melbourne. He was a man of studious habits. So far as his health permitted—it was never good—he took an active interest in all good works. He was especially interested in the Christian Endeavor movement, and was one of the founders of the East Coast Chautauqua, whose headquarters are at Melbourne. His interest in the natural world both in its animal and vegetable life, led him to identify himself with the Horticultural Society, and he watched its work and growth with much interest.

He passed away the 25th day of September, 1902, after an illness of several months.

APPENDIX.

[At the request of several members, and for the accommodation of new life members desiring the back numbers, it was decided to republish extracts from the best papers produced during the history of the Society. This replaces in part the issues destroyed in the Jacksonville fire and furnishes to some extent, an elementary work on Florida fruit culture.]

CITRUS FRUITS—ORANGES—BEST VARIETIES.

E. S. Hubbard—In early varieties of oranges, I know of no standard, all-around sort. We have a number of early varieties, but none that fill the requirements satisfactorily. Several of the Mandarin tribe, in special localities, are giving good results; in other sections, they may not make a good growth, or the size of the fruit is too small. The Satsuma colors and ripens very early in many localities but the tree is a weak grower. The Tangerona has been experimented with somewhat, but hardly enough to recommend this variety for general cultivation. The Yellow Mandarin in some soils, ripens early, being colored and sweet enough to ship by the 1st of November. Throughout the orange belt generally, the Red Tangerine is probably the most satisfactory of the earlier ripening class of Mandarin oranges; it can be shipped for the Christmas market. Among the round oranges, Centennial, Parson Brown and Nonpareil are the most satisfactory of the early varieties; they have sufficient acid to make them palatable, and are sweet enough to eat when colored enough for shipping.

For mid-season, the Jaffa may be considered the stand-by. There is quite a long list of mid-season varieties that have little advantage over each other, such as Ruby, Knickerbocker and Amory among the bloods, and Prolific and Paper Rind among the St. Michaels.

Among the late oranges I know of no superior to Hart's Late; the tree, in my experience, stood the last cold as well, or better, than any other variety. The Valencia is also desirable.

Rev. Lyman Phelps—The Valencia Late I consider a most superior orange; and taking everything into account, I prefer it to any of the fully-tested late varieties. The Malta varieties, all of them, will always pay; with one exception—the variety known as Gary's Mediterranean Sweet, which I do not recommend—I would say, cultivate the Malta varieties.

H. B. Stevens—In our section we prize the Pineapple orange very highly; it is a heavy, smooth fruit, a good bearer, a good shipper and comes into bearing early—that is to say, the trees bear young—it ripens in mid-season. For an all-around orange we like it best.

Mr. Manville—I remember seeing a foot-note by the Pomologist of the Agri-

cultural Department, at Washingon, referring to the Pineapple orange as a shy bearer, and I would like to ask Mr. Stevens as to its bearing qualities.

Mr. Stevens—It bears the best of anything we have. The first tree of this variety that ever bore is in my vicinity and when the bud was eight months old, it bore two oranges. We have thirty acres planted in this variety; the trees when set out were two-year old buds, the first of them being planted in 1889. I don't remember what the yield was the first year or two, but last year we shipped 1,700 boxes from this thirty acres, and we find that this part of our Citra grove pays us better than any grove we have.

H. E. Anderson—I find the Pineapple a very profitable variety, and often wish I had more of them; with me they are a very rapid grower. The Nonpareil, which Mr. Hubbard has referred to, I like very much; it makes a large tree and is very prolific. And I am very much in favor of Hart's Late, as I always get a big price for this variety.

J. B. Anderson—I am inclined to think that Mr. Stevens and his neighbors have a monopoly of the Pineapple orange. The aroma and other distinctive qualities, that are developed to such a marked degree upon the soil of the Citra district, are not, in my experience, developed to anything like this extent elsewhere. We have the Pineapple variety upon both pine and hammock land, and when the fruit is ripe, no one can tell that they are a distinctive variety. On the other hand the Pineapple orange from Orange Lake, in season, and when ripe, has a peculiar pineapple flavor and when placed alongside of ordinary oranges the fruit is readily distinguishable by its aroma, as well as its appearance. I have concluded, therefore, that the Pineapple orange as known in market by its distinctive qualities, will remain the exclusive product of the Citra district.

W. S. Hart—I would like a little more information about Boone's Early. I have been given the impression that the tree was a poor grower. I should like to hear from those who have had experience as to this.

W. H. H. Holdridge—I have a number of Boone's Early trees and find them very strong growers. At one year from the planting several of my trees bore, but did not sustain their character for earliness in that first bearing; they were not fit to eat early and did not ripen until mid-season.

Mr. Hubbard—The specimens of this variety which I saw at Sanford some years ago, at the time it was named by the Executive Committee, gave evidence of being a strong hybrid with the grape fruit. The character of the fruit was quite diverse; most of the specimens were light colored, with calyx quite distinct. Some of them resembled the Maltas quite closely. Some of them had hardly any seeds and were of fine texture but others were coarse and quite seedy. The fruit, as examined at that time, did not seem to be thoroughly established. I think it would take culture and selection to establish the seedless and early sweetening type of fruit, before the variety would become valuable . The fact that the fruit on Mr. Holdridge's young trees was not early was not significant; many early oranges, when first budded, and when the tree is growing vigorously, will be coarse and acid; they won't show very early ripening qualities until the tree has got size and is bearing heavy, but when large enough to bear several boxes of

fruit will be of ordinary size.—Report for 1895.

BEST STOCKS FOR SOUTH FLORIDA.

We have used for stocks, the sour, bitter sweet and sweet orange, the Florida rough lemon and the grape fruit. The first and second appear to be equally good though some have the opinion that the second has the most vigor of the trees, they are to be preferred to all others on account of their immunity from that much-dreaded disease, foot-rot. It is claimed that they will not do well in the lighter soils in the State, but it is a question whether it will pay at all to plant where the sour stock will not thrive under proper care and with a reasonable amount of fertilizer. The sweet stock has thus far, I believe, been free from foot-rot in California and Louisiana, but there is more or less risk in planting it in any part of Florida. The rough lemon has been thought not liable to foot-rot and though I have inquired into the matter during the past six years have not found or heard of a tree affected by this disease until the present spring.

In a grove of sweet seedlings and younger budded trees on sweet stock, that have nearly all succumbed; there were two rough lemons, one is dead and the other nearly so. In the same grove are two seedling grape fruit trees, both uninjured; notwithstanding this, the rough lemon is much to be preferred for the lighter soils of South Florida, and I would not hesitate to plant it in any well drained soil, suitable for citrus fruit culture. Buds on this stock in our own and neighboring groves are more thrifty, hold their fruit better and are less affected by drought than any others. The grape fruit stock makes a magnificent headed tree and the fruit is of an exceptionally fine quality, or at least I have so found it in three different groves where some of the buds are about thirty years old. In one of these groves there are thirty old buds on rough lemon stocks and none of them affected by foot-rot, though many of the sweet seedlings about them have died of that disease. On the western side of the entrance to Safety Harbor in Hillsboro county lies what is known as the Philippi Hammock. It is a spot of rare natural beauty and in places it must be thirty to fifty feet above tide water. On nearly the highest part, which is a rich shell soil Dr. Philippi fifty years ago planted seed which came from Cuba. After the war the place was neglected to a considerable extent and the orange trees are now dead or dying while the grape fruit trees are in a thrifty condition, bearing annually large crops of very excellent fruit. It would therefore appear that the grape fruit can safely be planted in shell lands where the sweet orange under certain conditions, is comparatively short-lived.—A. L. Duncan, 1892.

TRIFOLIATA STOCKS FOR NORTH FLORIDA.

Trifoliata is considered the most capable of resisting cold of any of the citrus family owing to the fact that the sap, even early in the fall ceases to flow so fully as to cause it to drop its leaves and becomes a deciduous tree. It also remains dormant in the spring, until after other varieties of oranges are in full growth.

Other varieties of oranges worked on trifoliata partake of this character to a large extent and will not start a new

growth so early in the season, thus enabling them to stand with much better results. Such trees are also early bearers, nearly all varieties fruiting the second season from bud. While, of course, the fruit would be just as liable to injury from cold, the trees themselves will prove much more hardy. It is true that the orange worked on the trifoliata stocks, will produce but a dwarf tree, just how much so I do not think we yet know, but the fact may not at all prove a disadvantage. Such trees could be much easier protected in case of severe cold, the fruit can be gathered more cheaply, and from the fact of the trees being planted so much closer the yield per acre could probably fall but little short of standard trees. This law could, I think, be used to our advantage through double working, budding the sour stock with trifoliata, as near the ground as possible, and budding the sweet varieties in the trifoliata .Trees worked in this manner, which are planted in groves do not start growth or bloom so early in spring as standard trees. The trees I have are not so situated that I can give conclusive evidence as to special hardiness as compared with those not worked, but I have never had one so worked that has been severely injured by cold. I have never had one frozen at the surface of the ground, even small trees, as is common with both sweet and sour stocks, they being planted so that the junction of the trifoliata with the sour stock is below the surface thus getting the benefit of the hardier trifoliata.

They will, I imagine, prove as it were a half dwarf, although the largest tree I have, a tangerine, is now fifteen feet high. Such trees are good growers, and a point in their favor is that they are early bearers and very prolific and will, I believe, be of value to us in making profitable, cheaply grown oranges.—A. H. Crane, 1892.

TREES FROM PIECE ROOTS.

I noticed several sprouts coming up where the orange tree had been before. I let them grow, and in two or three different cases going around I budded those sprouts. I did not want them there and a year or two afterwards I started to move them, and to my utter astonishment they were nothing but everlasting long roots. I removed three or four of those old roots ten feet long, large as my arm. I thought I was going to have my labor for my pains. I took them and put them in the grove in place of trees that died out, and to my utter astonishment in three or four years they had formed strong tap roots. At the time of the freeze those three or four trees were as fine trees as there were in that whole grove, bearing as high as ten boxes a tree. I examined those trees three or four years after they were planted to see if they had put down tap roots, and to my astonishment they had, and had put out lateral roots all around.—H. F. Douglass, 1896.

SINGLE TRUNKS BEST.

All over our section trees with a single trunk stood the freeze of December, 1894, much better than trees having several trunks. A tree with one trunk has much thicker bark than a tree with a divided stem. The result of my observation leads me to believe that a tree with one trunk, one solid trunk, will stand a harder freeze without injury than a tree of the same size with two trunks, because upon the two trunks the bark will be much thinner than upon the one trunk. I have reached the conclusion that it is cer-

tainly better to have but one trunk up to a height of two or three feet. The February freeze came along and wiped out everything, but the difference in the effect of the December freeze upon the single and divided stem was very marked. I have been budding all the way from one to half a dozen sprouts to the tree. I think in the central part of the State it would be best to let only one trunk grow. About the sprouts on the lateral roots: when the old trunk dies out altogether, and is gone, the latter will be in exposed places, and may be blown over. Where the sprouts come up from the laterals they will have no tap root and in course of time will be blown over.—James A. Harris 1896.

HAMMOCK GROVES.

Of the soils best suited to the oranges however, in my opinion there is no equal to the high grade hammock. On this land the trees grow rapidly, remain healthy and bear fruit abundantly for several years, if properly cultivated without other food supply than is in the soil and natural upon the land. The fruit has the fine quality of juiciness and flavor of the low hammock land oranges, with a thicker rind and firmer texture that causes them to stand shipping like the pine land product. Liberal fertilizing is required after awhile upon these as upon all other lands but not before the crops already produced have given satisfactory income with which to purchase it, and the encouragement so thoroughly appreciated at this stage of the orange growers' experience. These lands are underlaid with yellow sand, coquina sometimes being found at quite a depth from the surface near Rock Ledge. They need no draining, and in this part of the State can be easily and cheaply irrigated if thought desirable by artesian wells. Along the banks of our rivers such lands are sometimes covered with thick beds of oyster shells which make the ground hard to work, and as a rule the trees are not as healthy or long-lived as where these are absent. The shells, however, when burned to lime make an excellent application to apply to groves when there is a good supply of humus in the ground.

Fertilizers.

Any of the above classes of land will grow thrifty trees and produce several heavy crops of fine fruit before showing the need of fertilizers but this fact has caused many grove owners of this coast to delay so long before giving the needed help as to stint the growth of the tree and in some cases even starve to the extent of becoming worthless.

On the high, naturally poor pine lands of the interior where the trees are liberally fertilized from the beginning may be found some of the finest looking groves of the State and, judging by the reports that we get from their owners, they may be made quite profitable, notwithstanding the fruit is apt to be coarse skinned and rusty.

Groves on any quality of pine or hammock lands require fertilizing sooner or later as no land is strong enough in all the elements of plant food to sustain the tree in a healthy, vigorous and fruitful condition indefinitely.

This fact established it would seem the part of sound judgment and true economy to commence the application before the trees seriously feel the lack of food, for underfed trees are not only unprofitable for the time being, but, as when the life of any living thing is threatened, its

tendency is towards reproduction, they will produce fruit at the expense of the vitality of the tree, and very soon become an easy prey to frost, disease or insect enemies if false economy is practiced in this direction.

Preparing the Land.

In preparing low, heavy hammock for an orange grove mainly, simply dig up the ground where the trees are to set, into low mounds; then fall the trees and let the larger ones lay where they fall for several years. After the orange trees are set they work about them with a hoe, enlarging the circle of prepared ground each year, until all is gone over. In the meantime the weeds are cut occasionally with a bush scythe, and this is all the cultivation the grove gets until most of the natural growth has rotted and gone back to the ground. Groves certainly do well on such land under this treatment and possibly it is as good as any; at least it is not as expensive as some other methods. The writer, in clearing his gray hammock land, cleans it up thoroughly, piling the logs and brush to one side to rot for fertilizer, plows it and cross plows it several times over and plants a crop of cow peas to turn under before setting the trees, and he is content with the outcome. The methods in practice range all the way between these two.

Culture.

Many are the theories as to the mode of culture best adapted to the orange and lemon tree, and strong advocates ready to give good reasons why their plan is best may be found for all of them but the one most generally adopted in this section is to keep the ground clean and mellow from the time when the danger of injurious frosts is past until about the middle of May, and then either have some crop coming on that will shade the ground and bring to the surface fertilizing elements that have gone below the feeding roots of the orange—such as cow peas, castor beans, beggarweed, etc.—or else let the weeds and crab-grass grow. As this grass makes good hay it is usually cut and fed to stock and then returned to the grove or it is raked up to the trees in February, to save as a mulch until it rots down and is turned into the soil again, thereby adding the much needed humus.

In lieu of growing crops on the ground some coat the whole surface with leaves from the hammock or palmetto scrub, or with rushes from the salt marshes. This treatment gives satisfactory results, especially the hard-wood leaves, which are a natural and perfect fertilizer as well as a good mulch for citrus trees. Clean culture at all times is practiced by some here, still, but seems to be rapidly going out of favor although the trees make a thrifty growth for the first two or three years. It is generally conceded, however, that to leave the ground bare to the direct rays of the sun for the year is very detrimental to it, besides leaving much of the ground idle when it might be growing crops that would be of value to the trees as fertilizer later on.—W. S. Hart, 1889.

DISTANCE AND HEIGHT OF TREES.

Mr. Healy—My trees are twenty-five by twenty-five feet, and if I had the courage I would go in today and cut down every other tree, and get it out of the way, but I can't do it. I know I would get more fruit and better fruit. I have not get there yet. I would set the Tan-

gerine and Mandarin just as far apart as the others. The King Tangerine tree is one of the largest trees that we make. There is no question but that it is going to make one of the largest trees that we have. My Tangerine grove was planted originally for a round orange grove, twenty-five feet apart, but from the very fact that it is twenty-five feet apart I count that I am getting very poor returns when I net anything less than $3,000 for the fruit. I got $3,000 for it on the trees this year. I have another grove that is fifteen feet apart and that little grove every dry spell turns up and drops its fruit. Just as soon as those limbs commence to meet together I am going to take it out. A Tangerine or Mandarin orange is not worth one cent unless you can market it fancy and unless it is fancy. If you put them fifteen or twenty feet apart and try to raise fruit you will get left every time. The fertilizer I do not think will overcome it. I think that land in Florida with us is a great deal cheaper than irrigating plants and fertilizers.

Mr. Holdridge—The parties that have set their trees that way say they plant the trees thick together to protect one another while young and cut them down when they get old. I want to know if that is better protection than to have them further apart, and have a dense, thick spreading tree.

Is there a man in Florida who has seen a good healthy sweet seedling tree killed by the frost, a healthy tree? I have not. I have seen trees killed, but I never saw such a tree as I describe killed. A tree that has a spread of thirty feet, the limbs must necessarily protect the ground under the trees and protect the body of the trees.

Professor Swingle—I would like to ask if it is not cheaper to buy more acres. In regard to spraying those large trees is not that difficulty likely to come up. There is no doubt that if you will give them all the fertilizer and care that they will grow fifty or sixty feet high. Now in many parts of the State it is necessary to spray the fruit. Of course by improved methods of fertilization you may do away with this spraying.

Each time the blight takes away one of your trees you are subject to a much greater loss. If you have a grove of smaller trees you can afford to lose one, but the large trees are usually the oldest ones.

Mr. Healy—Do you mean by getting smaller trees to plant them closer together? I do not know about that for the trees do not hold the fruit if they are crowded together. If you get the low tree to spread forty feet it is greater than the high tree anywhere. I do not know how you would go at it to get a low tree, unless by a successful method of cutting them back.

Mr. Moremen—If you will go into our hammocks you will notice that the water oak grows very tall and slender where it is crowded, but when it is planted out it is spreading, and I think that this holds true with the orange tree. Regarding the budded trees near me, at Mandarin, they have some of the oldest trees in the State and they are budded trees that have made a spread of thirty or forty feet, and I have never seen seedling trees in any section of the State that are as large as these budded trees. The freeze of '86 killed every one of those trees that had buds eighteen inches to two feet in diameter. The owner had trees there from which he made a state-

ment at an orange meeting that he could count on getting one hundred boxes from four trees. The trees were trimmed up possibly ten or twelve feet above the ground, and you had to have a ladder to get up to the first limbs.

Mr. Holdridge—The question has been asked how to get these low trees. In the first place, give them the root, and in the second place crowd them the first year. Where the land was the richest and the trees grew the fastest the more side branches they made near the ground, and if a tree once gets started up without side branches I never could get them to come down.—Report for 1894.

VALUE OF IRRIGATION.

Mr. Hamlin of your committee, has had supervision of a twenty-five acre hose system for John B. Stetson, of DeLand. This system has not been wholly satisfactory, because of lack of sufficient water, and because the lateral pipes were too small, and it is now being replaced by a larger plant. The present source of water supply is a lake fed by living springs located more than a mile from some of the groves. The area to be watered is about two hundred and fifty acres.

The pumping station of brick is at the lake. In it is a tubular boiler of eighty horse-power, and a sixteen by ten 1-4x 10 Worthington pump, capable of lifting 860 gallons per minute. An additional pump will be added when the piping is completed. The water is elevated into a 100,000 gallon iron tank, which is elevated eighty feet on an iron tower. Water can also be pumped directly into the main. The tank affords water for spraying and all other purposes desired, without running the pump every day. An eight inch main is run to the several groves to be irrigated. The grove mains are six and four inches, and the laterals two and one-half inch pipe. Two inch hydrants are located from 100 to 150 feet apart. But few of the groves are yet fully piped. The entire plant will cost from $40,000 to $50,000.

Before this expenditure was determined upon careful investigation was made as to the result of irrigation in the State, and the necessity of it upon high sandy soil. Two objects were borne in mind.

First. The prevention of a total loss of the orange crop in seasons of drouth.

Second. Its full development in seasons of unequal distribution of the rainfall.

Some fifty irrigation plants were visited and reports from as many more obtained. From practical experience, and as the result of these investigations the following observations are made. We do not dignify them all as positive conclusions. Some of them were not inducements to put in this plant but apply rather to the method of using it. They are inserted here as milestones to guide the future wayfarer mindful of the fact that some of the measurements may not be found accurate, viz: Irrigated groves show greater growth in the early season, when the growth is especially desirable. The fruit ripens earlier. Navel trees have in many instances been made to bear by the free use of water about blooming time. No injurious effect was found as to the quality of irrigated fruit. If there be danger of damage to the shipping qualities of fruit from excessive moisture it can be avoided by care. The same intelligence is required in irrigation as in the application of fertilizer and other

grove work. Water should be applied from the middle of March to the close of the dry season. At other times only enough should be used to keep leaves from curling or fruit from dropping. It is not desirable to apply water to the leaves in the hot sun of noonday. The water supply should be ample or irrigation should not be attempted. It is questionable whether from a deep well, with water fifty or more feet from the surface, irrigation is practicable or profitable. Grove mains should not be less than four inch and laterals not less than two and one-half inch pipe. Large boiler and pump is true economy.

The amount of moisture evaporated by large orange trees almost passes comprehension. In few groves of large trees can much moisture be found at any time far down among the roots. It matters not how far apart the trees are set, there is dry earth under them. There has not been sufficient rainfall for best results for several years. Whether this is caused by the great forest depletion or how long it will continue is not known, but the best remedy that is available is irrigation. It is questionable whether young trees demand artificial watering. Irrigated land holds the moisture better and more readily catches and retains the fertilizing elements of the atmosphere. Fertilizers applied and the minerals of the soil are rendered immediately available. The fertilizing elements contained in the water itself can only be determined by analysis, but are likely to exist here, as well as in California and elsewhere. It may be feasible to apply muddy or thick mucky water by means of pumps similar to those in use in mines and which lift pebbles and even pieces of rock. Water cannot be depended upon to take the place of fertilizers.—A. J. Hamlin, 1893.

TIME OF STARTING NOT CONTROLLABLE.

Last fall I stopped working my grove about the 10th of October; there was no more work done; it seems the opinion of others was to stop the cultivation in the fall as soon as possible that the trees might harden up. I did this and was confident that I had struck the right plan. Some of my neighbors continued to plow until February, and as I can see their groves went through the freeze just as well as mine did, and they were fertilized heavily too. It seems the citrus tree can stand almost any kind of treatment and there is no fixed rule to go by.

I wish to quote Maj. Healy; he said, "all of this proves rot." As I stated before, we had trees all around Tampa, some of which had been worked every month in the year, others which were not worked after the first of October, and all had a growth five or six inches long and all endured a temperature of twenty-six without any injury. It proves nothing.—M. E. Gillett, 1900.

PROTECTION WITH FOREST BELTS.

In my own case I have solved the problem, though its solution was not original with me, by putting my trees out in small groves of only about two acres each and leaving a border about fifty feet wide of heavy timber about each. These borders of course take considerable valuable land, and I have been often told it was a pity to waste it that way, but I consider it of far more value with tall oaks, cedar, bay and palmetto trees thereon than if cleared and planted to any fruit trees. These belts of high timber have protected the smaller orange

trees and the fruit from both wind and the effect of freezes to such extent that I now have confidence to hold my crop as late as I see fit without fear of its ever being injured by cold to that extent that I cannot realize a good living income from it, and with a reasonable hope that the seasons in which it will receive any injury at all may be like angels' visits—"few and far between."

Do I know positively that this fruit was frozen, and how do I know that it was the belts of timber that brought it out in such good shape? That the oranges had ice clear through them I know because I cut many of them in two on the morning of the 14th of January last, and found it there and showed to those who were with me. To the other question I reply that the nearer the oranges were to these belts of timber on the east side of each grove the better their condition after the freeze, while the fruit in my neighborhood that was without protection of this kind was very badly damaged and in a short time lost its juice and became worthless. I have one grove that is so set that the longest way is east and west, and another that the west side is higher than the east. and on that account should escape with less injury if in open ground. The fruit on the northeast corner of both these groves, where the sun struck it early in the morning, was badly injured and some of it on the highest ground was so worthless that I did not market it at all. I would not put my brand upon any of it, but sent the best into the market as orphans and without a name to give it prestige. The trees are protected not only by being shaded from the morning sun when frozen, but they are held back in the spring and commence to grow later than those more exposed and are thereafter better able to withstand late freezes.

There is one point, however, in regard to these belts of timber that I would call especial attention to and that is that they should not be left so dense as to form a dead windbreak, but should be 'underbrushed' and left so open that all the lighter currents of air may circulate under and among them. If this is neglected I believe they would do more harm than good as the heavy winds would be more likely to whirl down into the clearings instead of sliding over as they do with me, and the cold on still nights would accumulate in the groves as it does in a valley surrounded by high hills. I believe that this one point is sufficient to explain, to a large extent, the difference of opinions held as to the value of timber borders, but the fact of many getting their clearings too large may in some cases be a cause for adverse opinions.

A BLANKET OF SMOKE.

Covering the grove with a blanket of smoke during short cold snaps has been advocated by many, tried by a few and made an occasional success by one here and there. There was one notable case near the writer's home where two sisters saved their orange crop from a late freeze, that took the young fruit off of the groves near by them in the spring of 1892. The trees were large and the ladies filled the air among and above them with smoke by keeping small fires burning in the grove throughout the night and well into the morning.

The effect of smoke is the same as that of timber borders, preventing the radiation of heat in the night and shading from the sun in the morning, but smoke must be made for the occasion while the

borders are always there ready to lend their protection, even though the master, wrapped in warm blankets, lies dreaming of "India's coral strand" until nine o'clock in the morning. But should he realize the danger and resort to the use of smoke as an additional safeguard, what could be of more assistance in making its use effectual than these belts of high timber to enclose it and cause it to linger longer and more densely just where it is wanted? Nor would the heated airs from the fires in rising draw in so cold a draft from under the timber as where the grove was set in open ground. In the foregoing I have only referred incidentally to the value of these belts as a protection against injury to tree and fruit from heavy winds. Here on the coast their utility in that direction alone is sufficient to compensate liberally for the devoting of the requisite amount of land to their growth. In many instances where this was neglected and the natural protection cut away when first clearing the land, lofty structures have since been built of scantling and wooden strips, the latter nailed two or three inches apart, for protection on the open, windy side, and at intervals throughout the grove.

That the forest trees may not feast unrestrained upon the $45 fertilizer applied to the groves, a ditch two and one-half feet deep should be dug next the borders. Roots will run under this to some extent, but with a ship carpenter's broad axe a man can work along the ditch chopping down some six inches into the dirt at the bottom and cut nearly all of them. In putting up part of my crop of last season that was considerably injured I was often struck with the great difference in the effect of freezing upon different fruit. Richly colored, thin skinned, high grade round oranges, seldom showed injury to any marked degree, while those of pear shape, coarser texture and pale yellow rind, showed a lack of the well-balanced food rations necessary to the best development of fruit and tree, lost their juice rapidly and very quickly became entirely worthless. This and other points noted lead me to believe that proper fertilization is another factor having much more to do with making fruit and trees resistant to the effects of severe cold than is generally believed. —W. S. Hart, 1893.

PROTECTION WITH OPEN FIRES.

In regard to building fires in groves. During the freeze of February I was told of a grove where fires had been built and was told that they had lost no leaves; and all bloomed heavily. The groves I have charge of now are near Tampa, the trees are twenty-five years old and many of them bear many oranges; we had fires twenty-five to thirty feet apart just under each tree. In December we fired for the first time with the thermometer at twenty-four, but thinking that the thermometer would fall as it usually does, we started other fires. When we began firing the thermometer stood at twenty-four; within thirty minutes although the ground was frozen hard, the temperature had risen ten degrees, making it thirty-four, and the ground immediately thawed out soft. I was satisfied with the experiment, although we did not need the fires. By six o'clock the thermometer was thirty-six, with a stiff wind. I had no experience in firing under those conditions, but we began lighting the fires and went from one grove to the other watching the thermometer, which regis-

tered twenty-six. The thermometer on the inside registered thirty-two to thirty-three. We had the wood piled up and got chips and brush matted together with rosin, from the turpentine stills, cut it up into chunks and put pieces of it under the end of the wood pile. I had tongs and would take hold of a piece, put it into the fire and get it thoroughly lighted and a man would run through the grove and ignite these piles. This turpentine or rosin will igite almost under any conditions. I put some in a bucket of water two hours and then lit it with a match. We kept those fires going until six o'clock in the morning. During the last freeze there were buds a foot long, but I did not see any damage.—M. E. Gillett, 1900.

PROTECTION WITH TRIANGLES AND OPEN FIRES.

As a more practical test a triangle was constructed of boards. The tree selected was five feet high. The two sides of the triangle were made six feet high, of boards eight feet long laid on edge. The open side of the triangle faced the southeast, our cold winds invariably coming from the northwest.

During the January freeze a thermometer placed just outside the wing of the triangle showed a temperature of eighteen degrees Fahrenheit. Another thermometer placed on the innermost limb of the tree and hence farthest from the fire showed forty-two degrees. The fire was not a large one, simply three small sticks of wood blazing a foot and a half high.

So satisfactory were the results that we at once directed that a portion of the high wall be torn down and constructed into triangles. Thirty of the largest grapefruit and some other varieties of orange trees were selected.

At the time of the February blizzard these trees in the triangles were in the tenderest condition; they had made the largest new growth of all the trees in the grove. They were simply bristling all over with new growth from five to ten inches long with some bloom.

The triangles were placed in charge of a regular hand as part of his regular work for the night.

The result was completly satisfactory; the new growth and bloom were as bright next morning and continued to grow as if no blizzard had occurred. These trees matured the leaves and wood of the first growth fully two weeks earlier than those protected by any other device.

All our experiments with this form of protection would indicate that, if properly handled, it can be relied upon as absolute protection against any temperature that has ever reached the orange belt; and I am of the opinion that even much lower temperatures can be successfully overcome with them.

Owing to the fact that the triangle was introduced hurriedly just before the February blizzard and the wood gathered from other parts of the grove, we cannot give the exact figures as to the cost of firing. The fuel burned we believe need not exceed one-third the amount necessary for ordinary open fires.

We dismiss this part of the subject by saying that we have great confidence in the triangle as a means of thorough protection, and predict for it an important place in the future of the orange culture.

Perhaps the cheapest form of protection if a new grove is to be planted would be to plant dwarf trees in rows running

northeast by southwest, planting them as close as practicable, say eight feet apart. The rows should be fifty feet, better seventy-five feet apart. Construct a portable fence that can be placed close up against the trees on the northwest side and fire on the southeast. In this arrangement a tree ten feet high could be protected with a twelve foot fence, or ninety-six square feet of fence for each tree.—Professor J. Y. McKinney, 1900.

ROSIN FIRES.

I have had considerable experience in the same line. We have been trying fires every freeze we have had since '76, and I observed last February in the very cold weather, the orange trees didn't burn as easily as formerly. The blaze went right through one tree, a tree about the size the doctor speaks of, and it was not destroyed, not even scorched by that blaze. I have found the best way to carry on intermediate fires through the groves is by using the cheapest grade of rosin you can get. In that way one man can attend to five acres. I enveloped it in paper packages. Six pounds of rosin will burn about one hour without any attention, and give you good heat and smoke; and the cheaper the rosin the better it will burn. The high grade rosin will burn like a flash, like turpentine, burn too quick. You can set it within two feet of the tree and not hurt the tree at all, provided your limbs are not within two feet of the fire. In February we burned rosin in iron pots. We found when the iron got hot we had to fill them up oftener. So I tried paper packages; it takes six pounds to the hour in pots. The idea the doctor suggests of having a large fire to the west or northwest is good, but you cannot always do it; it takes an awful sight of expense to get it ready; it takes an army of men, especially if you have a large grove. I take common hardware paper, and then give it a coat of paint. I make it six inches in diameter and six inches high, and make it a cone shape. You set the rosin on fire at the top, the sides will remain firm. You must paint it because the rosin will dissolve the paper. There is a little secret about setting it afire; you must set fire to it very quickly. You must pulverize your rosin on top, and take a piece of oil waste and drop it in and set fire.—H. B. Stevens, 1896.

SPRIG BUDDING ON STUMPS.

A great many ways have been suggested and practiced to restore our orange trees. That of cutting down promptly to sound wood and grafting the stumps, though not generally done, has, when properly done, been very successful, and when successfully done, two or three years' time is saved. The requisites for success, are as follows: Cut down to perfectly sound wood, use dormant scions; insert between bark and wood, so as to make a close union, and then in order to preserve the moisture in scion, bank it with earth nearly to the top. The proper time for this was, of course, right after the catastrophe. Where failure occurred it was due to various causes, such as failure to reach sound wood, or perhaps too old, imperfect mechanical execution of the work, advanced season, etc.

At our meeting last year some of our leading members doubted the wisdom of this method of bringing our groves back to bearing. That it was the proper course to pursue, it seems to me, cannot longer be questioned. In one of our groves

ninety-five per cent. of the grafts "took." The success in this grove must be attributed first to the condition in which the trees were during the cold weather, viz., well protected by earth thrown to them with plow; secondly, the roots are the rough Florida lemon, averaging one and a half inches, a nice size to work.

In the grove where these pictures were taken, the roots are of sour and sweet orange, and the stock varying in size, where cut off, from two to three inches; seventy per cent. of these grafts are living and have made a growth varying from two to nine feet in height. Some are so full of fruit, particularly the pomelos, that if only one quarter now on the trees matures, it will necessitate the propping of the trees. We have been advised by many to "thin out" the fruit on these grafts, fearing the effort to mature such a crop (seventy pomelos to one tree), will cause its death.—Ed Winters, 1896.

HARVESTING AND PACKING TOOLS.

It may not be interesting to some, but it seems to me that the implements for handling the fruit crop, and methods of handling it, are two of the most important subjects for us to consider. I brought some things here apparently not worthy of consideration, but I think for a good many here who are investing in orange culture, all may prove so. I have here an apron, with pockets, that will be found very useful to the box maker or orange packer.

I have never seen but one make of step-ladder on the market that was so made as to stand hard usage. Strength is lost sight of in working for lightness and looks. As good ladders can be made at home as can be bought, and at a saving of money. The one I have here is a home-made step-ladder standing 6 1-4 feet high, sides 3 3-4 inches wide, 13-16 inches thick, 7 feet, 3 inches long, upper half of sides beveled to 5-8, at edges, from 1-3 of width on each outer edge, treads 1x3 inches, set one foot apart and cut into sides 1-8 inch, top tread 1 foot, 4 inches by 6 inches, sides cut into it, sides 13 inches apart at top and 27 at bottom; under top tread, at the back, is a board 7 1-2 inches wide; brace legs, hinged to this, are 5 feet, 5 inches long by 2 3-4 feet x 1 inch, two pieces connecting them straight across and one diagonally. This ladder made of cypress, and painted; is light, stands firmly, and is durable.

Clippers.

I have never seen a perfect orange clipper yet. This Snider clipper is a well-made tool and has other good points, but the bevel is on the wrong side of the blade, which makes it impossible to cut the stem so short, but that it is liable to puncture and ruin any orange that comes in contact with it, and such orange may spoil a box when packed. This Summer's clipper does perfect work. It will shave the calyx close to the fruit and do no injury, is very handy to work with, but is made too light, and will not stand long or hard usage. Here is a new make of clipper, sent in by Mr. C. H. Curtiss of Astor. He claims good work, and durability for it. I have not used it, so know nothing of its merits. There are others on the market, but none that I have used that could not be greatly improved upon. Cannot some inventive citizen of this State meet the requirements of a perfect orange clipper?

I have been working for some time to

perfect some kind of a fruit receptacle that would thoroughly protect the fruit from thorns or other injury while being carried about in the tree and on ladders by the picker. The nearest I have come to what I want is this bag, with strap to go over the shoulder, made two thicknesses of heavy canvas on the front, and with a flap at the bottom, so that when full the bearer can, by stooping a little, lower it to the bottom of the box, then unhitch the flap from this harness snap, by straightening up leave the fruit in the field box without any pouring or dropping, and surely unharmed. I have these bags, also, made of sheepskin, with the wool inside, an idea given to me by a lady from the Azore Islands, where orange culture is much older than in Florida. These protect the fruit perfectly from thorns, but allow of jamming between the limbs, or the ladder and the body of the picker. This is an element of danger only with careless pickers, but to obviate it I have had this and other styles of tin receptacles made to fit clear around the body and hang on the shoulders with suspenders. This arrangement makes it easy to carry a heavy load of fruit. At the front you see a trap door for the discharge of the load. This receptacle will allow of even getting into a lemon tree, without danger of either thorning or jamming the fruit, but it is not a success on account of the fruits bridging between the outer and inner sides when unloading. Possibly this may be prevented by having the space narrow at the back, and widen as it approaches the door.

Note 1.—The best picking receptacles that I know of up to this date are baskets made by the Wakefield Rattan Company, of Boston, and one of galvanized iron invented by Mr. J. P. Mace, of Lake Helen, Fla. Both are carried at the side by a strap over the shoulders.

Field Boxes.

These field boxes, for carrying the fruit from grove to packing house, are of my own invention. The ends or heads are 1x10x12 inches, and have a hand hold two inches down from the upper edge; on the inside at the top is a half-inch rabbet cut one-half inch deep; and across the ends of the heads, except for one inch up from the bottom is nailed a cleat 1x1-2 inch. This strip forms a stop at each end of the rabbet and also prevents the heads from splitting. Just flush with the bottom of the rabbet is nailed a half-inch cleat along its length that serves to make the bottom of the rabbet one inch wide.

The heads are one inch further apart at the top than at the bottom.

The sides and bottoms are the ordinary sawed pine 1-4 inch thick by 6 inches wide; these are better than veneer, being stiffer, which prevents pinching of fruit; the sides are nailed 1 inch up from the bottoms, leaving free circulation of air, the ends stand 3 inches above the sides.

These boxes hold about two-thirds of a standard box of packed fruit, and can be piled, one above another, as high as a person can reach, without danger of crushing the fruit. The rabbets hold them from slipping, when tiered up in hauling, and as there is free ventilation and no heavy mass of fruit in any one box, they can be stacked up in the packing house, and left until the fruit is needed, with as little danger of injury as though they were in slatted bins.

My packing house is so made that I

can drive to the back of it and put the fruit into shallow bins, with slatted bottoms, holding six to seven standard boxes of fruit. They are six feet long by five feet wide, and are hung in the middle so that they can be tipped to slant forward or back, thereby greatly facilitating the putting in or taking out of fruit from either the front or back, as they can be tipped so that the fruit rolls to or from your hand, and it also allows of two decks of wide bins, thereby saving much space. I grade the fruit from bin to bin, making three grades. Fancy, No. 1 Bright, and No. 2 Bright; Russet, I have practically none of. In grading, I examine every orange carefully. If it is dirty, and rubbing will not clean it, it is washed, either with a brush or sawdust and water in a barrel hung on bearings.

Note 2.—I now wash all my oranges by running them through the S. C. Warner orange washer as they come from the grove. I think the markets in the future will call for all of the best grades of oranges to be washed. There are machines that use brushes for this purpose, but I have little experience with them. If scaly, the insects are scraped off with a light spatula, made of hard pine.

From the bins they are sized.

I have here the Ayer improved sizer. The one great advantage of this one over other rapid sizers is that it does not let a flat orange through any sooner than a round one. This is the trouble with most sizers, they drop a flat orange in the bin with round ones of a much smaller size. With this sizer, an orange will drop in the same bin, if run through repeatedly, nearly every time.

Note 3.—There are several new sizers on the market, but the simplest, most accurate and light running that I have seen is the Huntley. The Ayer is not being made at present.

From the sizer, the fruit runs into bins having cloth bottoms, and it is taken from there by the packer, who can move his packing table, which has a top slanting toward him, to either bin.

Boxes.

Now as to boxes and box material. I have always found great difficulty in getting just what I wanted. If I send an order stating what I require, the sides come of poor quality of wood, or too thin, or they may be cut twenty-seven inches long, but 7-8 inch heads come with them; or cut 26 5-8 inches long, and the heads sent be 1 inch thick. Some of the Bangor sides are cut so wide that an edge has to be trimmed off. Others are not true at the ends, and have to be trimmed after the box is made up. The heads may be rough or cut twelve inches wide when green and then dried and shrunk to 11 1-2 inches, or they have a good deal of sap, and it is mildewed to a dark blue color. The Bangor side has been the favorite in the market for years past, but now there are some very fine pine veneers being gotten out in this State, that are likely to supersede them. The Leslie side is particularly fine and handsome. The panelled head is true, full sized, light and handsome, but is said not to stand well where roughly handled in transit. Can we not decide what we want, and, by demanding that, get it? It also cockles badly if it happens to get wet, but the manufacturers' combine say we must all use them in the near future, because of their economy of material.

I have here a device of my own invention for holding boxes when being made

up. It is light, can be taken under the arm and carried wherever wanted, can be used on a table, bench, or on the floor. It holds the heads true, while the sides and straps are being put on, and easily slips out when the box is completed. It is adapted to either a full box or the half box, used for the Oriental oranges. I use the saw palmetto leaf stems for straps. These are easily got of sufficient length, where growing in high scrub, and, after being cured in the shade for ten days or two weeks, become exceedingly tough and pliable, will turn the corners without breaking, and are a distinctive mark of Florida fruit. They are passed through a leather splitter, such as I have here, shaving off the rounded side and bringing them to a uniform thickness, and when placed upon a box, and the end fastened with a double-pointed tack, add greatly to its appearance. A fine grade of fancy shelf paper is pasted on the four sides of each compartment of the box at the bottom, as it appears when packing; and the fruit is so packed as to have this on top when the box is opened on that side. For this purpose the brands on the first three layers are turned down, but first I put in the 11x11 display card for the retailer to use to call attention to the fruit. The fruit is carefully and closely packed, after being wrapped in this paper that has my address and private brand upon it; the oranges coming up 1-2 to 3-4 inch above the box, according to size of orange.

From the packing table the full boxes go to the floor, and are slid against stops under this press, straps pulled from under the double-pointed tacks, and raised to admit the cover. With a movement of the thumb this press is loosened and brought down across the box, the nailer sits down upon the lever and nails the cover. The press is of my own production, and its special feature is that its bearings are next the hoops, where the nailing is to be done, and allows the middle of each section to bulge, if the box is tightly packed, and as the fruit shrinks in transit the spring of the cover takes up the slack, and the box is still snug. It also brings the fruit all down at once, and thereby saves all dangerous lateral pressure. When there is no lever used, the knee or lever of the operator presses the middle of the section below the outside to get the end down, and crushes the fruit, at the very first, below where it need ever go, thereby bursting it or badly crushing it, if the box is as full as it should be packed. Then, to nail the middle and other end, a lateral pressure is brought to bear upon it, which is liable to still further injure the fruit. Many of the presses used have this same fault of pressing the middles more than the edges.

If fruit is so mashed, it will cause the rest of the fruit in the box to decay also, if it is long on the way to market.

I always buy the best material, bead the edges of all the sides before the boxes are made, and trim all rough edges from the box after the cover is put on. I use a printing wheel, with pretty type, trade mark and border upon it for printing the heads before they go into the boxes, and in every way try to give my fruit a handsome appearance. I put twelve to fifteen cents more per box into the work and material than most people, and the pith of the whole matter is that this, with the fine quality of fruit, causes it to bring $1 per box more in the market than the highest market quotations at the time of sale. I have none of these home-made appliances for sale, but

the ideas embodied in them are at the service of any member of the Society who chooses to make use of them.—W. S. Hart, 1892.

PINEAPPLES.

[This chapter is compiled from various oral reports and remarks made by Mr. McCarty before the Society at various times.—Secretary.]

The character of the land on which pineapples are grown in this region varies. We classify it as spruce pine, scrub oak, hickory and hammock. Past expedience shows that the best land for successful pineapple growing is the well elevated, well drained spruce pine, scrub oak and hickory land. Hammock does not seem to be so well adapted to this plant. There is an excess of humus or leaf mould in the soil in case of high hammock, and the land is likely to lie too low for good drainage and general safety in the case of low hammock.

We do not believe that so much depends upon a few miles north or south as upon a corresponding number of feet in altitude above the level of the river. In this we do not take the position that there is nothing in latitude, but very much in altitude.

Plants.

There seems to be some confusion as to the means by which pineapples are propagated. I will briefly state the local names of the various pineapple plant growths, with sufficient information for the new-comer to identify them and become familiar with the phraseology of this business. They are: 1 slips, 2 suckers, 3 rattoons, 4 crowns, 5 crownlets. The slips grow at the top of the fruit stalk, around the base of the apple, and are the most prolific source of propagation. The sucker grows out of the axil of the leaf of the parent plant. The rattoon might be called a root sucker, that is, it grows out of the base of the plant at or below the surface of the ground. The crown occupies the center and top of the ripened fruit. The crownlet, as its name implies, is a little crown or small plant that sometimes grows around the base of the crown proper. They are not considered desirable as plants, being too small for the rapid production of fruit; however, by careful nursing in three years time they usually develop a fair fruit. In very choice or fancy varieties they are planted in nurseries and transplanted when sufficiently grown.

The crown proper, when cut and some of the lower leaves removed, makes a good plant, but it is found by observation to be inclined to "sport," as the botanists put it. The same is probably true of the crownlet. The rattoon is a desirable addition to the original plant, because it grows low down and aids the perpetuity of the plantation. The fruit which it produces is not usually so large as that produced by the suckers. The suckers come out of the axil of the leaves, and vary in number from one to four, averaging about two to the plant, and are the plants that produce the succeeding crop. The number of slips per apple varies from three to six in the common varieties, and sometimes as high as twelve or even twenty in some of the fancy varieties.

Regarding the

Preparation of the Land.

the method of clearing it, and the planting of it out, we will follow the most time tried and well tested methods. In this as in all other agricultural matters, the

methods of procedure will differ somewhat and embody the ideas of various people. We will give it as we find it most successfully in vogue throughout the region under discussion. The land must be cleared of grubs, the roots, stumps and trees thoroughly removed, and land left in a condition similar to that of a garden. We clear the land mostly in the winter and spring, having it ready for setting in June, July and August. We use for marking an instrument which marks four or five rows at a time, and can be handled by one man. At present the most of the work on pineapple plantations is done by hand. This will rapidly change as domestic animals of all kinds are being rapidly introduced, and the methods of performing much of this labor will soon be simplified and made much easier.

There is much difference of opinion as to the proper distance of planting pineapples. A few years ago it was believed that 25x30 inches or 28x28 was sufficiently close. These distances have been steadily narrowed down until today the greater portion of the fields are being planted 20x20 or 22x22 in squares. Some even think that 18x18 is sufficient room. Experience, however, is showing that 20x20 answers all the objections to long distance planting and fills all the requirements for short distance planting. The reason why long distances are being discarded and shorter distances advocated is because of the support that the suckers give each other as the years go by. Twelve thousand to 15,000 per acre are planted.

Distances.

To the new-comer it is perhaps necessary to say that after planting slips in the summer season it requires from eighteen months to two years to bring these plants to maturity and obtain the first crop of fruit. The field then produces the next year from the suckers, and continues to do this for six or seven years, producing five to seven good crops before resetting. These suckers have a more slender hold on the plant than the original plant had upon the soil, and with each succeeding year the sucker grows higher up on the plant and becomes more unsteady; consequently they require the support of each other, and this support can only be obtained by close planting. In long distance planting there is a tendency for the suckers to lean over and the fruit to become sunburnt and injured on one side, as it is likely to do when not standing in an upright or erect position. While this is the fundamental reason for short distance planting, there are numerous other economic reasons based on good practical experience, which recommend it to the new comer. Personally, we plant out the Red Spanish 20x20 and recommend that as a safe distance. After the suckers grow, this number is perhaps doubled, and it will be readily seen that this is a very large number of plants, and that sufficient space must be allowed around each to put fertilizer, and upon which to walk and work in caring for the plantation. These distances apply to the Red Spanish, Strawberry, or Key Largo variety, which is the common pine of commerce.

The Porto Rico, which is a remarkably large plant, producing an apple weighing from eight to fifteen pounds, requires more space. We think 24x30 inches about right for it. The Egyptian Queen, another of our better varieties, requires a distance of about 22x22 inches. The Abbaka and Smooth Cayenne require a little more distance than the Red Spanish.

We think 22x22 a fair distance for these. However, if a man plants but few and has time to stake up or support the plants greater distances may be allowed.

Preparation of the Plant for Setting.

Where slips are selected, and they usually are, for the basis of a new field, they should be from six to twelve inches in length. The ordinary commercial guarantee now is for plants not less than eight inches in length. It is very important that the plants should be large, stocky and well matured. The reasons for this need not be discussed. Many disagreeable experiences verify the wisdom of selecting large, fine plants. Having the plant in hand, the base is cut off, and a few of the lower leaves removed in order that the roots may meet with no obstruction in their downward and outward growth. This requires some time, but is a safe and wise operation. A few people have tried planting slips without cutting or preparing them, but with very indifferent results. Whatever the theorizer may say, the practical pineapple grower always prepares, or shucks his slips.

The preparation of suckers for planting is somewhat similar, except that a larger number of leaves should be removed, and if the sucker is very large the top should be cut back, in order that the wind may not blow the plant over, and for other good reasons. In planting slips and suckers we use a dibble or garden trowel. We insert the sucker about three inches into the soil and the slip from one and one-half to two inches, according to its size. A man can plant 1,500 slips per day, preparing his own slips and marking his own land. Where the slips are prepared in advance he can set or put into the ground from 5,000 to 10,000 per day but this is the smallest part of the work; in our experience we have found that the man who gathers, shucks, marks his own land, distributes his own plants, and sets 1,000 slips per day has done a good average day's work. In this work much depends on the conveniences at hand.

Fertilizing and Cultivation.

As a practical guide the following brief statement might be made to cover the subject of cultivation and fertilizing. It will probably be better than a general discussion of this subject. Assuming that the slips are planted in July or August, six weeks should be allowed for the plants to mature root before they are cultivated or fertilized. Some writers have recommended fertilizing in the bud with cottonseed meal immediately on planting. While this might have some advantages in showery weather, it has many serious disadvantages in dry weather. After considering that subject carefully for some years and discussing it with some of the most intelligent pineapple growers in this region, and accumulating their experiences, I have concluded that as a general policy fertilizing in the bud immediately on planting is not safe. In the first place no plant can assimilate or use fertilizer until it commences to grow. In the second place the active element in cotton seed meal is ammonia, which generates in the decomposition of the meal a sufficient quantity of heat to burn out the heart of the plant. I am now outlining a safe policy. Under some circumstances, and in some kinds of weather, and with some degree of caution, this method might be pursued, but in the hands of the inexperienced new-comer it is liable to serious objections. It is not best to cultivate the pineapple until it is

rooted for the reason that anything touching it knocks it out of the ground and displaces it, as it has a very slender hold on the soil until it commences to root. There is little or no danger of weeds or grass growing on the land during the six weeks that no cultivation is resorted to.

At the end of six weeks a small quantity of cottonseed meal, equal to about 300 pounds to the acre, is placed in the bud of the plant and sometimes around the base of the plant, and a scuffle hoe is run over the land to smooth it down and stir the soil. This small quantity of fertilizer is readily utilized by the growing plant, while the paste it forms brings out any sand that may be in the bud. After that the plants should be worked every month or six weeks at the outside until they come to bearing. A hand cultivator is now being used, which reduces materially the amount of labor, but the scuffle hoe can probably never be discarded entirely, because of the many advantages it has as a tool for the cultivation of our Florida soil. There is still, however, some room for improvement in the reduction of human labor required on our pineapple plantations.

The matter of fertilizing is of primary importance, and an intelligent knowledge of it involves the discussion of a few principles, the application of which by the intelligent grower will answer the many questions which daily arise along this line. The pineapple plant requires for its successful growth and fruit, the following elements: Ammonia, phosphoric acid, potash and with these lime, magnesia and soda. The plant itself grows principally upon ammonia in its various forms. Its fruiting quality depends largely upon the potash element, consequently that line of fertilizing should be followed out which gives to the young and growing plants during the first year of their existence the necessary ammonia, compounded a little with phosphoric acid and potash. As the plant nears maturity and is about to bloom and fruit, the elements of phosphoric acid and potash should be increased until at the last application the potash element should largely predominate and the ammonia element have largely disappeared. To make this practical, we will say that ammonia is derived from cotton seed meal, sulphate of ammonia and nitrate of soda as chemical constituents, and also from decomposing animal and vegetable matter generally. Phosphoric acid is obtained from soft phosphate and the various bone preparations, bone being the best and most valuable source from which this element is obtained. Potash comes to us in various forms, as kainit and the various grades and percentages of sulphate of potash.

A Good Formula

for a plant growing fertilizer will contain six to eight per cent ammonia, four or five per cent phosphoric acid, and two to three per cent potash. This is a well balanced plant grower. A lower percentage of phosphoric acid and potash and a higher percentage of ammonia as a plant grower, will not be injurious. Cottonseed meal as a basis for ammonia seems to be desirable, as it comes to us in good condition, free from adulteration, and contains nearly eighty per cent of vegetable fibre and two per cent of potash in a very desirable form. Nitrate of soda furnishes a useful source of ammonia but is probably more expensive than the cottonseed meal, and being so highly concentrated is dangerous in the hands of a new comer, but sometimes very useful in

the hands of an expert. Many of the fish fertilizers are rich in the plant growing elements. Blood and bone is also very desirable.

Soft phosphate and the bone preparations are safe and sure sources of phosphoric acid, the most economical of which is probably the soft phosphate. In speaking of soft phosphate throughout this article we wish to be understood that there should be no sulphuric acid used in its preparation, as experience shows that sulphuric acid is dangerous to the roots of the pineapple plant. The various grades of bone preparations, are safe and can be used without danger. The use of potash, which comes to us usually in the form of sulphate ranging from forty-eight to ninety-five per cent., is attended with some danger. Potash will burn out the heart of the plant, and any fertilizer having it in large quantities must be kept carefully from the leaves of the plant as well as from the heart. Bone, cottonseed meal, and soft phosphate in ordinary quantities will not injure the hearts of the plants, but potash in its many forms does injure the plants.

We find as a formula for growing plants about one year old that four to five per cent ammonia, five to seven per cent phosphoric acid, and three to four per cent potash, is a good all round combination. For fruiting plants, three to four per cent ammonia, six to eight per cent phosphoric acid, and ten to twelve per cent potash we find a most desirable formula. After a little experience and observation the beginner will soon learn the safe and economic course to pursue.

Costs.

The following is a fair summary of the costs of bringing the pineapples into bearing:

Cost of clearing land ready for setting, per acre,	$50.00
Cost of slips, 12,000, at $5 per 1,000, per acre,	60.00
Cost of setting plants, at $1.25 per 1,000, per acre,	15.00
Cost of fertilizing for the entire period, per acre,	30.00
Cost of cultivation for the entire period, per acre,	25.00
Total, per acre,	$180.00

Add to this the cost of the land, which will vary from $20 to $100 per acre, according to location. The man of limited means can feel assured that good pineapple growing land can be found for him at $25 per acre. For the man who can afford to indulge his notions and preferences, the higher priced and improved lands are open.

Some of the published estimates have exceeded the above. There has been a marked reduction in the cost of clearing, slips and fertilizer in the past two years, and we believe the above estimate is based on recent experience, and prices as they are now. This estimate is based on the common pineapple slips, season of 1899. This is the ordinary pineapple of commerce, and is known as Red Spanish, Black Spanish, Scarlet, Key Largo, Havanna, Cuban, Strawberry, etc.

There are sixty-six enumerated varieties, but when it is seen that the identically same variety has seven or more names it will be seen that the differences are not so large as at first appears.

A fair list of desirable varieties would embrace: 1 Red Spanish, 2 Egyptian Queen, 3 Ripley, 4 Abbaka, 5 Smooth Cayenne, 6 Porto Rico, 7 Enville City. It costs a great deal to start the fancy varieties. Some people prefer to handle a

more limited area and get fancy results per acre. This subject is left for the individual judgment of the would-be planter.

It will be borne in mind that pineapples yield five to seven crops without replanting, and since the principal cost is for land and clearing, that the income from the second, third, fourth and fifth crops, which can be made as large or larger than the first, is mainly profit, there being only the expense of cultivation and fertilizer, which will be about $50 per year per acre. The land can be replanted for a new series of crops, first putting it in good condition.

Most of the planting is done in July, August and September. The earlier the better. The crop is harvested mainly between May 20th and July 15th. There are a few, however, during the entire year. They go in crates holding about one-half a barrel, being 10 1-2x12x36 inches, and holding from eighteen to forty-eight, according to size. We pay ten cents apiece for crates, delivered. Taking the entire process of harvesting and shipping it will run about fifteen to twenty crates per day to the man, and will cost not far from twenty-five cents per crate, all told.

Pines will run from 120 to 250 crates to the acre. One hundred and sixty crates per acre is perhaps a fair average for the seven crops. Of course they will differ widely in this respect. With some of the varieties that grow to fifteen pounds, and run twelve to eighteen to the full crate, you could get a very large number of crates to the acre. The figures above are for common pines.

Queens will run about the same size as Red Spanish, but will average more money—due to superior quality. The crop of 1897 averaged about $2.00 per standard crate and though smaller in volume that other crops, was better in price.

Protection from Cold.

Some use a switch grass which grows with us and which can be laid on top of the plants. We covered 150,000 plants, principally with the saw palmetto leaves. We keep the entire clump together, so that we can lay them over the plants without their being blown away by the wind. It is a good protection, warm and cosy, it is cheap and not injurious to anything. The cabbage palmetto fan is the same. Put on the first of January and taken off the first of March it only costs you $10 or $15 an acre, as against an investment of $300 to $500 in a shed.—C. T. McCarty.

[The Secretary has thought it unnecessary to describe the Orlando and West Coast pineapple sheds. A sufficient variety of these will be found in the orange section.—Secretary.]

PEACH CULTURE.

Of those varieties of the Peen-to type that succeed in the northern portion of the State, Waldo, Jewell, Angel and Bidwell's Late are the most prominent. All varieties of the Peen-to type would succeed throughout the entire northern section of the State were it not for the liability of many varieties of this type to be caught by cold while in bloom—they are nearly all earlier bloomers than are the varieties of the Honey type. The four varieties above named are, however, later bloomers than most other varieties belonging to the Peen-to type, and it is on this account that they generally produce a crop—even in the northern portion of the State—while other varieties

of the same type, such as Bidwell's Early, Maggie, Yum Yum, etc., are apt to fail.

Of the Honey type, referred to as more fully to be depended upon in northern Florida, the Honey itself is a most excellent variety, and in addition to this, several of its seedlings, such as Imperial, Oviedo, Florida Gem, etc., are very largely planted. All of the varieties above named are larger than the parent Honey, as are also Climax, Sangmel, Taber and several others, nearly all of which are a little later in ripening than the parent Honey.

For South Florida, the varieties belonging to the Peen-to type are, as above stated, the best adapted. Of these, the Peen-to itself, a unique peach of flat shape and distinct flavor, is well worthy of continued planting. The noyau or slightly bitter flavor that it is possessed of when improperly fertilized and poorly cultivated is entirely overcome by liberal applications of fertilizers rich in potash combined with thorough cultivation. And in this connection, I would say that no one should attempt to raise peaches for profit without fertilizing freely and practicing thorough and frequent cultivation.

From the parent Peen-to many very fine seedlings have been produced, which have made a departure from the Peen-to in shape; the most of them taking the roundish or roundish-oblong form which is generally characteristic of other varieties, while some of them assume more or less of the pointed form characteristic of the Honey. This is the result of natural crossing with varieties of the Honey type. Some of these Peen-to seedlings which have been given names and are largely planted in South Florida, are Bidwell's Early, Waldo, Jewel, Angel, Suber, Maggie Yum Yum, Bidwell's Late, etc. Some of these are planted more largely than others in certain localities where they have originated and become locally known. All of them are, however, adapted to the entire southern portion of the State, and some of these varieties, as previously mentioned, are also well adapted to the more northern sections of the State.

Apart from the Peen-to and Honey types above referred to, the Red Ceylon is a variety that succeeds admirably in South Florida, and is well adapted for culinary uses.

The Japan Dwarf Blood also succeeds very well in the greater part of both North and South Florida.—Geo. L. Taber, 1898.

President Taber—Replying to the gentleman's question, I will say I do not approve of cutting back the trees. If I had a large peach orchard I should not do it. There is a great deal more in thinning the fruit than in cutting the trees back. Apply fertilizers and pick off the surplus fruit. If you have curculio-stung fruit you can go ahead and pick out the stung fruit and still have a crop left.

A Member—From my section of country the tendency of the tree is to run to the top and bear a few on the top. Would you not advise pruning these?

Answer—What varieties?

The Member—Peen-to.

President—There are undoubtedly cases where a little pruning might be advisable. The saying is that the exception proves the rule. I do not think it is advisable as a general thing.—Geo. L. Taber. 1898.

Thin Out on Trees.

The present is an off year with peaches in our locality, only the two and three

year olds having a fair crop. A grove of 200 trees from which were shipped nearly 700 crates last year, have only 150 crates this year, and this on only one out of four varieties. All were allowed to overbear last year, a fair crop dropping to the ground; no system of thinning out was practiced by the owner, hence fruit was of all sizes and in clusters. I would urge upon all who enter this field the importance of thinning out the fruit; this will in a measure correct the over-production of undersized fruit one year, and an almost total failure the next year. It pays every time to cull on the trees. Experience has proved it to be a costly mistake to allow cull, stung fruit and ripe drops, to remain and rot under a peach tree or within the orchard. They should be raked up, fed to the hogs or destroyed. They become the main source of the remarkable increase in fruit stung by curculio or other such pests in years following such neglect. I am of the opinion where no fruit is allowed to rot or remain under trees and clean culture followed, loss of crop and inferior fruit from this cause will be wonderfully reduced. All Peen-to and Honey strains are liable to set too many; in some instances I have seen an entire crop lost as too small and bitter for any use, by over-loading. A drought in May will aggravate the destruction from this cause. ****

Planting.

I use only common sense in planting, prefer three to four or four to five foot trees, buying best I can afford, cutting cane back to two or two and one-half feet; cut off all lateral branches, prune all bruised roots and main roots back to five or six inches. I attend to these close the first year, rubbing off all shoots eighteen inches or so below top, doing it twice up to May 1. Fertilize often, one-half pound at a time, will get two and one-half to three by July 10. Larger trees three years old will get seven pounds by July 10.

I used to think a peach ripening as late as July too late for northern markets. A careful note of last year's business dissolves that view. First class, selected Florida peaches, Imperial and other varieties arriving to market in good order, sold at top prices in competition with California and Georgia Elberta; ten crates, 10th of July, '96, brought $2.75 and $3 per crate, with urgent calls for more like them at same or better prices, but $1.75 for same fruit in State markets was considered good enough, so sold at home.

Clean culture from early spring until end of August is my choice; have known loss of good crop by stopping work first of July, allowing trees to become dormant, and early and second early out in bloom Thanksgiving. Work and push them late. Any complete orange fertilizer will answer. I use Fruit and Vine, applying an extra dose of sulphate of potash; used muriate this year.

I know of another young orchard planted this spring, of about 150 or more trees, set about eighteen feet apart. It had a fairly good start, but the owner planted a continuous row of watermelons along each centre—the vines are very early and extra fine—the trees are yellow leaved today. In my opinion it's a failure at the start. No after care can overcome the crop of root knot now planted by the million on these tracts, and I fear no competition from such sources. How many such there are elsewhere I know not. I have combated this disease in odd spots

in various groves too long not to be able to foresee the result there.

The Borer.

The peach borer is a serious enemy to combat on some soils. It's not present in such large numbers on all. The low bottoms with hard-pan subsoil I find most subject to it. I have removed from eight to twelve borers from three-year-old trees where neglected on such soil. The higher land is least liable to attack, but all locations are subject to them. Go over all trees twice a year for first three or four years, dig them out with a sharp knife and small wire hook. I have seen trees seven-eighths girdled by them. It would be folly to underestimate their destructiveness There are various washes recommended for trunks of trees; soft soap painted on in month of May sounds good; I am watching an experiment with coal tar. I would not dare use it until fully tested.

The Curculio.

I became fully convinced of the uselessness of attempting to combat the unknown with arsenical poisons and decided at once to begin the construction of a machine for trapping them by jarring the trees. I made a receiver after a description I read of those in use by Mr. Hale, of Georgia, planning as I went along. In due time I constructed a machine which has proven very satisfactory. (A drawing of this I have with me.) It is a hopper, circular in form, sixteen feet in diameter, covered with strong drilling, set upon a wheelbarrow frame with two wheels, a pole two by two inches and seven feet long with a thick rubber buffer on the end to prevent injury to the bark of the trees, a carpenter mallet, and I was ready to hammer out the secret fee, whatever form it might take. My neighbors and the passersby took considerable interest in my machine as it progressed and many sly comments were ventured on it as to its ultimate use; but I said little and kept on "sawing wood."

I selected a two-acre orchard of three-year-old Angel peach trees next to my house to operate on. On March 15th I made my first round, taking my catch of all sorts and comparing them with illustrations in the government article referred to, and with the aid of a microscope was soon able to identify the plum curculio. I took ten of them on this date from fifty-five trees. Having removed all doubts, and running the enemy to earth, so to speak, I gave them no rest, for a time at least working this lot once a day, then for awhile about three times a week. On March 19th I took ninety curculio from those fifty-five trees with my receiver, then sixty, then down to thirty, then eight and ten and finally none. There can be no question as to its identity. I have a sample bottle with me and can furnish a brood to start with to any member desirous of increasing his live stock. I believe they begin work here as early as March 1st, following up the younger and later varieties. I find them mostly on the younger fruit, but if none, I am satisfied they continue operations on the larger, how long I cannot tell yet. I found them at work May 2, and took fifty or more on fruit one inch in diameter. A careful examination shows very little stung fruit on the trees operated upon, but who for a moment can question the value of the small amount of labor so spent? The taking of close to 300 curculio from fifty-five trees is sure to make a considerable gain of perfect fruit. Last season some of these trees with three

crates (estimated) dropped fully one-half just on the point of ripening.

Prof. C. V. Riley estimates the number of eggs laid by a single female curculio as from fifty to one hundred, which are laid at the rate of five or ten per day. I shall hereafter depend entirely upon the catcher and jarring of trees for combating this destructive insect. Chickens may assist but I find no evidence of it in my orchards. If penned around a few trees it would be better. The removal of fallen fruit is essential. The pig would be of great assistance, provided he did not make a hog of himself and climb the trees, being sure to secure all the fruit within his reach, stung and unstung. His presence in our groves where loaded trees droop very low would be very destructive; I'll have none of him. Catch the curculio before he does all the damage he is capable of, is my advice.

To assist in this warfare I had all my plum trees, and they were many and of many varieties, cut down this past winter. They were unprofitable and a fruitful source of increase of curculio.—Walter Cooper, 1897 and 1898.

Watering Chilled Trees.

There were one or two points that I notice were mentioned that strike me as being of very great importance. One was the effect upon our trees immediately after one of the frosts. I experimented with peaches and I have three trees that are now nine years old that are healthy, thrifty, growing trees, and those are the only thrifty growing trees out of four or five hundred, and those three recovered from the freeze of March, three years ago, when all the others died back. The reason was that I just went to those three trees and watered them for ten or fifteen days after the freeze. Those are the only trees that have any tops to them now. There are three trees that have fifteen feet of foliage from the body and they are full of fruit. I watered them after the freeze three years ago and that is what saved them. I kept a ditch full of water around them for three weeks. We did not have a drop of rain for over five weeks after that March freeze three years ago. The result was that the trees got a violent shock at that time. The cold set them back and the drought coming on there was nothing that would help them. I believe that if I had been able to run a ditch through my entire place I would have been able to have saved all of my trees and part of my fruit.—S. S. Harvey, 1894 .

LEMONS.

As to the location of the lemon grove I do not, generally speaking, consider it safe to plant a grove in any portion of North Florida, but it is difficult to say just how far south it is necessary to go, for I know of many fine trees growing much further north than I should care to plant out my own; but no matter where you put your grove the more protection of water and of heavy timber to the north and west of you the better, and in choosing a spot for a grove I should avoid as far as possible, the neighborhood of both bays and scrubs, for the cold is apt to be much more severe at such points. At this time, the largest and most profitable lemon groves in the State are perhaps located in the Lake Weir region of Marion county, and the Apopka section of Orange county, not forgetting the Belair grove near Sanford. Many trees during the past two years have been set out in the extreme

southern portion of the State and on the Caloosahatchee river.

The lemon should be carefully budded and quite low to the ground on strong and healthy stocks. Until the year 1887 many lemon and orange trees were budded on seedling Sicily lemons, and these were generally killed to the ground during the severe cold of that winter; others were budded on the wild Florida lemon and part of these passed through this season uninjured, while some were killed; other groves still were put on sweet and sour orange stocks and were injured very much less and in favored localities were hurt no more than orange trees of the same size. I should therefore certainly advise using the orange either sweet or sour, as a stock. I have large trees budded on the stocks and can see no material difference, though I generally favor the sour stock as being perhaps more hardy, less liable to disease and better suited for growing on low lands, though I think the sweet will be found preferable for very high and sandy soils.

For the successful growth of the lemon I prefer lands not too high and dry, as the fruit requires more moisture than the orange, and it is a noticeable fact that the rust mite seems to attack the fruit much worse under ordinary cultivation on the higher lands; still these higher lands, if properly shaded, will, I believe, produce fruit fully as fine and abundant. Lands with clay or hard pan not nearer the surface than four feet are very desirable, but no water must stand around the roots, and the richer the soil the better.

Planting.

In setting out the lemon grove, the method is similar to that followed with the orange, except as to the distance apart in placing the trees. Trees should be much closer, and fifteen by twenty feet on the lower lands, and twenty by twenty-five on the higher will be found more preferable, and I am by no means sure but that, on lands sufficiently rich and moist, ten by fifteen feet even would be the better distance, as in parts of Italy and Sicily. The closer the trees are planted, the sooner will the ground be shaded, and there is no longer any doubt but that the lemon needs shade and plenty of it, and the sooner the branches reach out and cover the surface of the ground the better. I might in connection with this, mention an illustration that has recently come before me. In planting out a portion of a certain pine land grove some sixteen trees were accidentally put very close together and not more than ten to twelve feet apart. These have been set out some six years now, and produced the past season a much more abundant crop of fruit than any of the surrounding trees. All of this fruit was handsome, sizable and bright, being entirely free from rust, while the rest of the grove had much less fruit, and a large proportion of it was badly rusted. The branches of these sixteen trees have reached out so far as to be interlocking, so much so that it is impossible to use the plow, and the entire surface of the ground is thrown into shade .

Cultivation.

In the cultivation of the lemon, the course pursued is the same as in orange culture for the first five years and until the tree begins to fruit. At that time trees well cultivated, pruned and fertilized, should be from ten to fifteen feet high and nearly as broad. After that I

MANATEE LEMON GROVE—SPRING OF 1900. SAME IN JUNE, 1902; 3,500 TREES; CROP 3,190 BOXES. F. D. WAITE, MANAGER.

should advise using the plow as little as possible and to cultivate with the sweep, shallow running cultivator and the hoe, stirring the soil only in the months of November and May. Use as much mulching as possible and only fertilize once a year, and that in the month of November. Put on a very liberal supply, spreading it over the entire surface, and I prefer such fertilizers as are rich in ammonia, since the lemon needs more food than the orange, and is a much more rampant grower under favorable conditions. Prune thoroughly at least once each year, and keep all dead or diseased wood cut away, and the tree should be hollowed out inside and kept free from water sprouts, the lower limbs and those touching the ground should be pinched back somewhat, wherever they have a tendency to push out long and straggling ends from the main body of the tree.

The lemon tree ought to begin to produce fruit about five years from the setting, provided it has been well cared for, and it will average from a quarter to a half box in that year and should double its yield annually until it will produce from six to eight boxes in the tenth to twelfth years, and this would be a safe number to reckon upon as an average yield of a grove. There are usually two crops of fruit, the first ripening in July and August, and the second in October and November. In some years the summer crop is the heavier and in some the autumnal. There are besides scattering lemons during the entire year, but not in sufficient quantity to be of any great value. In gathering and packing the fruit one cannot be too careful, and our growers are very apt to be careless in the grading and sizing of the same. The lemons should be carefully cut with clippers, put in baskets and not in sacks, as is customary, carried to the packing house, and then graded, rejecting all bruised, scratched, rough and overgrown ones and all russets, as it will not pay to ship such. Lemons should be sorted into three sizes, receiving two hundred, two hundred and fifty and three hundred to the box, the latter size being the most salable. This operation has to be done by the eye, as no sizer has yet been discovered that will suit the irregular shape of the lemon. It is perhaps well to have a board with holes cut in it of just the proper sizes and placed before the sorter as a guide to the eye, though some growers pass all lemons through these holes, but this is a slow and costly process, and the skilled sizer will soon learn to gauge with his eye the proper sizes. All fruit should be wrapped and placed as tightly in the boxes as possible.

There is much diversity of opinion as to the coloring of lemons, for the summer crop being picked when quite green, requires a curing or ripening process. After trying various methods, such as sweating, drying, exposing to the weather and subjecting to the fumes of sulphur, I have concluded that the better plan is to pack as soon as possible and ship at once only to such dealers as have curing rooms. The fruit ripens somewhat in transit, and after arrival can soon be cured and to much better advantage at its destination than it can be here. There is also a divergence of opinion as to when to pick the lemon. Some prefer to pick when the fruit reaches a diameter of from two to three inches, without regard to ripeness; others wait until it is fully grown and partially colored, but I prefer to gather whenever the peel has a smooth and shiny appearance, but do not al-

ways wait for this, and generally gather every lemon that reaches a diameter of two and a half inches by the fifteenth of July or before so as to reach the usually very high markets of that period.

I have found the lemon tree much freer from disease and insect pests than the orange, and it seems rarely troubled with blight or dieback under conditions where the orange tree would be sure to have one or the other. It also seems to be rarely troubled with scale. But its greatest enemy is the rust mite. A russet orange is salable at a reduced price, but a russet lemon has thus far proved unsalable, though really just as good, and it is probable that in the future there will be found a use for them, for there is nothing against them except their appearance. —H. S. Kedney, 1889.

THE KAKI OR PERSIMMON.

My knowledge of the growth of this fruit being confined to Florida, enables me to speak with certainty as to this State alone; and I expect to be verified by our growers when I say that there is no fruit tree in the State that grows more thrifty and vigorously, with so little manure and cultivation, as the kaki, especially when grafted or budded on our wild native stock, the Diospyrus Virginiana. But this native stock is best when grown from seed, as the old field root-sprouts are barren and less thrifty, besides being predisposed to harbor the ova and larva of a beetle of the genus Elaphidion which is the principal enemy of our kaki. The damage is done by the larva from the time of hatching until it enters the chrysalis state. The deadly work is done by cutting into the heart of the tree, and down the heart pith to and through all the large roots. The tree usually dies, but a few have survived in my experience.

There are but two other enemies to my knowledge, except perhaps the caterpillar, that defoliated one of my "Ginji" trees, but this one instance is all out of thousands of trees, but the caterpillars do damage our wild persimmons to considerable extent.

The two other enemies referred to above are first, a little worm that eats around the young bud, causing it to die, and the measly louse, an aphis, that sometimes infest the young tender leaves in midsummer; neither are serious, as the former is rare and can be avoided by root grafting (the proper way of propagating these trees), and the latter can be destroyed by the whale oil solution.

I have 600 trees, grafted on one-year-old seedling stalks last February, that will average in height six feet, some specimens being eight feet high, and two inches in diameter above the stock. These trees were never fertilized; in fact I am sanguine in my opinion that these trees can be successfully grown without fertilization. What the fruit would be under such treatment, I am unable to say, but from the experience of my neighbor, T. K. Godby, an intelligent and very observing nurseryman, who is cultivating the kaki, fertilization further than common muck is unnecessary. His fruit last year without further fertilization was equal to mine in size and flavor, many specimens weighing a pound and some over that weight.

The trees fruit very young, many at two years from the bud or graft, and some of my last February grafts set fruit in the nursery rows last summer. But a great and fatal mistake is made in letting such young trees fruit. I lost many young

trees by making this mistake. One thrifty young tree bore 250 fruit, and carried them bravely until they commenced to mature the seed, when in one day all its beautiful green leaves wilted and died.

These fruit trees seem to do well on almost any kind of Florida soil. They do fairly well on our clay subsoil flat woods, on the high dry ridges and also on wet bottom land.—B. F. Livingston, 1889.

Grafting vs. Budding.

Prof. Rolfs—I would like to know if anyone has had experience in grafting them high up in the persimmon. I have seen one or two trees grafted in this way, and I was wondering if that was better than crown grafting.

Mr. Bacon—I have seen them grafted high up and graft would grow so much more rapidly they would break off. I am not speaking in the commercial line but to encourage people to have fruit every day in the year; I would be sure and plant kaki, so as to have ripe fruit from September to March. My neighbor had fruit. He kept them spread on the floor, and he kept them until March. I would advise every household to plant three, four or half a dozen of persimmons, and have them come in rotation. Our worthy President, I think, knows more about kaki than any other man in the State. In regard to pears I would say to Mr. Hart that he does not have enough fruit to feed the birds and leave enough for himself. Feed the birds; they have a right here, and were here before we came.

Dr. Kerr—I am very fond of the fruit, but out of probably fifty grafts I have but two that lived. I would like to know the best time for grafting; I have understood low down is better than high up.

Mr. Hart—I am strongly in favor of grafting low down. Cleft grafting, low. Or, you can bud. In regards to birds, I don't think you can protect the kaki from birds entirely by having other fruits for them to feed on because they seem to like that better than other fruit. When the scuppernong family of grapes is ripe they will take the Flowers variety and leave the others alone, and after awhile the wild grapes develop and ripen and they go to the wild grapes. But with the kaki I don't think you can hope for that kind of protection. I have a larger variety of fruits on my grounds than any of my neighbors, and I notice that for each season they have a favorite kind of fruit to feed upon . We have also the coons and the possum to fight to protect this as well as other fruits.

Mr. Waite—Some say we can't graft them in large trees. I think that there are a great many here, perhaps, who have old fields and very large trees, and to cut these trees down a great many of them would die. I have grafted a great many of them, and by cutting the limbs off, about the size of my arm, and trying to insert a graft, as near the trunk of the tree as possible, I found they have done very well. But it will not do to cut away all the limbs at one time; if you do you have a nice growth for a month or two, and, all at once, your tree is dead.—Report for 1898 .

PECAN CULTURE.

The old plan advocated for starting a pecan grove was to plant the nuts where the trees were to stand, but for several reasons this is not desirable. Squirrels, moles and mice usually do away with a

considerable number. When the trees are grown the grove will in all probability be quite irregular and certainly will not make as rapid growth for the first three or four years as it would have done had two-year-old trees been set out in soil that had been previously well prepared.

If anyone wishes to grow a pecan grove from the seed let him prepare a nursery and plant the nuts there. The ground for this purpose should be as carefully prepared as for vegetable seeds and laid off in rows two to two and a half feet apart. In these rows plant the nuts four or five inches apart and when the trees are one or two years old transplant them to their permanent places .

Set Budded Trees.

Seedling trees and budded trees can be obtained from most of our nurserymen, and it seems to me it is a more satisfactory plan to obtain trees from them. Plant budded trees by preference, for while the pecan will come true to seed we cannot be certain to what exent. It may vary from fifty to one hundred per cent, and though the seedling trees may prove satisfactory from a commercial standpoint, still the same uniformity of product cannot be secured from a seedling as from a budded grove. Of budded trees do not plant one variety exclusively. The self sterility exists in the pecan, I must believe; to what extent among the varieties now propagated I do not know. There is considerable variation in the time of blooming of different varieties, and to be on the safe side solid blocks of single varieties should not be planted.

The ground on which the pecan grove is to stand should be thoroughly and carefully prepared previous to setting out the trees. If the ground has been cultivated for some time, it would be well to fertilize about the places where the trees are to stand, though I believe that the pecan can be made to grow even without this. If it is desired to plant the trees on pasture ground, it would be better to break it up, though the plan might be adopted of simply digging up and cultivating circular spots about where the trees are to stand or by cultivating strips along the line of rows. The trees should not be planted less than forty feet apart, and even at that distance the tops will touch in the course of twenty-five or thirty years, and many recommend that they be planted at a greater distance than this. But by heading in or cutting back the branches, I believe that this distance is ample. If on the other hand, the soil is rich and rather moist, it may be better to plant them fifty or even sixty feet apart. By using the triangular method and forty feet distance we can place thirty-nine trees to the acre. The ground should be carefully staked off and where each tree is to stand a hole should be dug three or four feet in diameter and as many feet deep. With the ground that is thrown out a liberal amount of fertilizer, composed of barnyard manure or some balanced commercial fertilizer should be mixed. This done, the soil should be thrown back into the hole and slightly mounded up. It is preferable that this be done two or three weeks before the time for planting.

Planting.

It is best to plant either one- or two-year-old trees, and my preference would be for the latter. At that age the trees will have from twelve to eighteen inches

of top and from three to four feet of root. The root should be cut back to the solid white wood within twelve to eighteen inches of the crown. Some few lateral roots will be found attached to the main tap root and these should be cut off. I do not believe it to be necessary to prune the top at all. The trees start off very nicely without cutting the top and if the top is cut they usually develop quite a number of shoots. If deemed advisable, however, the top may be cut off, leaving four or five inches, though I look upon it as so much loss, and one of the shoots trained up to become the trunk of the tree. During the time the trees are out of the ground care should be exercised that they do not become dried out, and neither sun nor wind should come in contact with them. This may not be absolutely necessary, but if one follows this plan he is on the safe side. At the experiment station in planting trees my plan is to wrap them in the shed in an old blanket which has been thoroughly moistened. The trees are then carried to the orchard in the wagon and as a tree is needed for planting, it is removed from the bundle.

The planting of young trees after the holes are dug, as already indicated, and the ground prepared, is a very simple matter. A sharp stick is thrust down into the center of the specially prepared portion as deep as is required, and in this hole the tree is set, and the earth carefully firmed about it. The best time for planting is immediately after the leaves fall in the autumn, or say the middle of November to the last of December. The winter showers will firmly pack the earth, the trees will become established and when the spring season comes on it is ready to start growing. It is well to mulch after planting or to keep the ground about the tree well cultivated to provide a surface mulch of earth.

Intercropping.

Seven or eight years must elapse before nuts will be produced though trees frequently fruit at an earlier age. From the time at which the trees come into bearing the crop increases until at fifteen or sixteen years old the grove will be quite remunerative. Up to the time that the trees commence to bear and even afterwards, the grove should be cultivated and one of two plans may be adopted. If the land is suitable for vegetable growing or the raising of cotton these crops may be planted in the grove for six or seven years, or until such time as so much shade is produced as to render their cultivation impracticable. Each year the planted area will become less. In some cases peach trees might be set out on the same ground to give place, later, to the pecan. By adopting any of these plans the ground will not be idle and may be put to remunerative use. On the other hand the plan may be adopted of pursuing a system of clean cultivation from February to July, and sowing down to beggarweed, cowpeas or velvet beans after the latter month. When the trees have become so large as to shade the whole ground they should be given sole possession, and some of the grasses might be sown at this time and the grove used as a pasture.

While, as I have already stated, the pecan will grow and produce large crops of nuts without fertilizing, still I believe that a certain amount of manuring will pay. If other crops are raised in the grove the fertilizing would consist in applying a little more than those crops

would use. If clean cultivation is adopted, the grove should be fertilized once or twice a year on the same principle as adopted for orange groves. A well balanced commercial fertilizer, barnyard manure, or some such form of fertilizer may be used. A splendid practice would be to grow and turn under various cover crops. After the trees have become well established, and their roots have deeply penetrated the soil, fertilizing will manifest its effects in fruit, while during the earlier life of the grove it will give increase in wood development.

Cutting the Tap-Root.

In reference to the matter of pruning, I have already made one statement to the effect that the tap root of a young tree should be cut when the tree is planted. Now, I know that many will disagree with this statement, but I am certain that the cutting of the tap root is attended by no evil results. In the first place, if there is any virtue in the tap root, a question which I am not going to discuss, the fact remains that it is replaced by a root or roots which develop from the place where the root has been cut. Furthermore, the cutting of the root has no injurious effects upon either the productiveness of the tree or the quality of the nut. This idea seems to have gotten a firm hold on the public mind, and it is high time that it should be laid aside. The subsequent pruning of the tree has relation principally to the forming of the head. Two plans may be adopted; the one of low heading, the other of letting the top of the tree develop as it chooses. The latter plan is the one usually adopted in Florida, and the lowest branches are allowed to develop from five to six feet from the ground. However, it may be advisable to adopt the other plan, as it will bring the bearing surface of the tree closer to the ground and a more compact head will be the result.—Prof. H. Harold Hume, 1900.

THE PEAR.

The LeConte is a very fine pear, if handled with reasonable good judgment. It is a very poor, almost worthless, fruit, if handled without good judgment. In cultivating the tree, rare good sense must be used to get the tree into proper shape and able to carry a portion of the fruit it will set. Its natural disposition is to make long, willowy limbs, and set a great mass of fruit at the extreme ends of those limbs. This natural disposition must be counteracted, so as to force increased size of limbs for their length, and distribute the fruit more evenly over the tree, and at the same time keep the fruit nearer the base of supply of food—the body and roots. After you have succeeded in raising fine trees, great care is necessary in preventing the trees from overloading—thinning out the trees severely. After this fruit has grown to be about mature, great care must be observed as to the proper time to pick it from the tree. Take a large, handsome pear from the tree before it is mature, and it will shrivel and become a tough, woody, tasteless mass—no juice no flavor. Allow it to mature on the tree, and pick it just as it changes to a light green—the skin becomes glazed at that time—and it will ripen in a few days to a rich, juicy fruit, of fine flavor. If covered with paper, or placed in a dark place, it will be much better. Then, again, if the fruit is allowed to remain on the trees until it begins to ripen—turn yellow—it becomes dry and mealy, and will rapidly decay at the core. It is the first and last of these stages that

has given and will continue to give, if persisted in, a bad name to the LeConte pear in the Northern markets. More care and better judgment must be used in picking and shipping the fruit, or we will find no market for the LeConte pear. I assert most positively that the LeConte is a fine fruit, one of the very best of pears, if raised, picked and handled properly. But I also think it the most difficult of good pears to handle properly. Great care must be used in picking from the trees, and still greater care must be used in the packing house to leave out all the under and over-ripe fruit.

At present the deciduous fruit business of our State is carried on in a loose, haphazard way ;unless we cultivate and market in a better, more business-like manner, we will find but little profit; and any year of a general full crop, we are likely to come out of the season with a large portion of the fruit on our hands, and a dead loss on that we send into market. The careless, indifferent shipper will destroy the markets and make a loss for all raisers.

The Kieffer pear is a fine wood maker, an early bearer, and the trees carry immense crops. It is still a question, to be decided by experience, as to whether it can be made a good money crop for our pear belt. The fruit grows to immense size, is not a very good hand pear, but one, if not the very best, of cooking pears. In the natural order, it should ripen here the last of September, but is fine for all culinary purposes if picked from the tree during August, long before it is full grown. If in the market during September or October, it comes in competition with the general fruit crop of the Middle and Northern States.

The Blight.

The blight appeared in some of the orchards of Middle Florida several years since. It gradually spread from year to year, until now there are but few orchards in the State that have not been attacked by that disease, so feared by the pear growers the world over. In some cases the orchards have been almost destroyed, in others very little damage has been done. But even where very severe, trees recover from it, and again bear the usual amount of fruit.

It is settled beyond doubt that the blight is caused by microbes likely of the plant kingdom; they belong to the family of bacteria, the smallest of living things. The question of dissemination is still unsettled, but the best authorities now think the microbes are disseminated by insects. It is agreed that the microbes only enter the tree through the tender buds and flowers, and pass to the larger limbs or body from the small stems, spurs, or limbs. It is also well settled that the microbe winters in the tree affected and if all diseased parts are carefully cut away and destroyed by burning, the disease will be much less prevalent and the damage to orchards be materially reduced. A careful cutting when the disease is shown by the dead leaves, and again in the fall at the annual pruning or thinning out, would be of great service, and with our present knowledge, the only preventive. The danger of leaving on the tree or ground the diseased wood, may be likened to leaving the body of a person who had died of yellow fever unburied. The sap of some trees may not be a congenial medium for the propagation of the microbe, as some people's blood is not a congenial medium for the propagation of the yellow fever

microbe. It seems to me that the remedy, if found, must be in working on the sap of the tree.—S. S. Harvey, 1895.

Mr Mellish—In planting pear trees with a view to keeping out the blight, they should be headed low, all the main limbs should come out below three feet, the object being to have the tops within reach, so that the blight can be seen and cut out readily. Then bear in mind that the blight always attacks new growth, never the old growth; and keep the new growth off the main limbs and branches, the attacks will then be confined to the extremities, where it can be cut out. If there are tender shoots on the trunk or large branches, the latter will be attacked, endangering the whole tree.

Secretary Manville—One word about blight. Pear blight is a local affection. It does not enter into the sap of the tree; it has no effect upon the tree beyond the parts attacked; it never extends through the organs or sap of the tree from the point of attack to other portions of the tree, but develops only by the extension of the local affection; the microbes work in the inner bark only, and they continue to work until sometimes large areas are involved; but they do not pass from one part of the tree to another, except by pushing out through the inner bark from the point of first attack—the damage lies in the destruction of this inner bark. Thus by cutting off a twig that has blight beyond the line of affection, that particular attack of blight is forever gotten rid of. As Mr. Mellish has said, blight can only get into the tree through the new growth and the blossoms. If the new growth is kept off the trunk and main laterals, the attacks will be confined to the terminal branches, and the question of preventing serious injury to the tree is simply a question of the feasibility of keeping the blight cut out as fast as it appears.—Report for 1895.

THE GRAPE.

In selecting a situation for a vineyard, the main point should be to avoid as far as possible low situations. If the roots be exposed to stagnant water, the vines are liable to become diseased and the grapes rot. All of the higher lands, both hammock and pine, are suitable. New hammock lands are to be preferred to either pine or those that have been in cultivation. After having selected a proper location for a vineyard, the next step will be the preparation of the soil for the reception of the young vines. In all sandy soils there is usually a want of organic materials, and that want should be supplied by applying a compost of leaves, muck, rushes, and marsh grass or stable manure. If the soil is not naturally good, or has been cropped for some considerable time, a compost of the above named materials should be spread upon the land and plowed in. On new hammock lands it is not necessary for the first year or two. If the soil is not dry it should be made so by drainage, but it is best to avoid all such locations.

The distance apart at which vines should be planted depends much upon the varieties and circumstances. As a general rule, I should prefer to set them eight feet apart in the row, running north and south, and the rows ten feet apart. This distance gives plenty of room to cultivate, and is sufficiently far apart to allow room to pass through with mule and cart for the purpose of fertilizing the land, etc.

In regard to choice of varieties much depends, although a large proportion of Northern varieties succeed well here. Af-

ter testing some forty varieties in the past seven years on my grounds, I would recommend Hartford, Delaware, Creveling, Ives Seedling, Concord, Wilder, Agawam, Merrimac and Telegraph for early, and Salem and Goethe for late. Of the above Hartford is the earliest. Bunch large, compact; berries large, black; vines vigorous, productive and healthy; ripe June 16 the past season.

Delaware—Bunch small to medium; berries rose-color; flesh juicy, very sweet; fruit of best quality for both table and wine; healthy; ripe June 25.

Creveling—Bunch loose; berries medium, black, sweet, and juicy; quality good; ripe June 25.

Ives Seedling—Bunch medium to large; berries medium, black; vines vigorous and healthy; a good wine-grape; ripe June 25.

Concord—Bunch large; berries black; good bearer; but ripens somewhat unevenly; ripe July 1.

Wilder—Bunch large; berries large, black, first quality; good grower; ripe—

Agawam—Bunch large; berries large; red or amber; strong grower; ripe July 1.

Merrimac—Bunch large; berries very large; black; vigorous grower; first quality; ripe July 1.

Telegraph—Bunch medium; compact, black; very vigorous; early and productive; ripe June 25.

Salem—Bunch large; berries large; nearly round; red; first quality; ripe July 8.

Goethe—Bunch usually large; berries large, oval; color, green tinged with red; vigorous; best quality; ripe July 8.

The season for planting in this climate is from November 15 to March 1, as the vine, although inactive for the formation of new wood and leaves in the winter months, is never so as to new roots. For that reason a vine planted previous to January 1 will become established before the ensuing spring, and make a much more vigorous growth than one planted later in the season. It is also better able to withstand the dry weather that we are sure to have in April and May.

Planting.

Before planting cut back all the longer roots to at least eighteen inches and the stem to about eight inches. Dig the holes at the required distances which should be three feet in diameter, and from six to eight inches deep, according to the size of the vine. Put a few shovelfuls of the compost previously mentioned in the hole, and incorporate it well with the subsoil. Spread the roots out carefully, and place the vines at such a depth that the crown of the root will be three inches below the surface; the ends of the roots should be a few inches lower. Use the surface soil to fill up. A few handfuls of bone-flour, or some thoroughly decomposed manure, will not come amiss if mixed with the soil in filling up, and will give the vines a vigorous start in the spring. When planting vines the first time in Florida, my instructions from the nurseryman were to plant so that the crown of the root would be eight inches below the surface of the ground; but from a press of other work I was somewhat neglectful of his instructions, and planted a portion shallower. The result was, that those planted shallow made much the best growth. And a few years after, having occasion to remove some of the vines, I found that those planted deep had thrown out new roots near the surface, and that the old roots

were in much the same condition as when planted out.

Before or after planting, a good, stout lightwood stake, seven feet long, should be driven down twelve inches from the vine. Having endeavored to give the necessary details for laying the foundations of our vineyard, the next important step is training. The first season only one cane should be allowed to grow—all the other shoots should be rubbed off. The after-culture the first season consists in keeping the ground free from weeds and the vines tied to the stakes. In December following, the cane that was allowed to grow the past season should be cut back to one foot, and two canes allowed to grow the following season—all other shoots being rubbed off, also any bunches of fruit should they make their appearance. The after-treatment for the second season being the same as in the previous year. You can now decide how you will train your future vines, whether to stakes or trellis.

The method I have adopted is to train to stakes, both for economy and because I deem that the best results can be obtained in that way on our light, sandy soils. Also, when trained in that manner, nearly all the fruit is shaded by the overhanging leaves, and ripens more evenly than when exposed to the direct rays of the sun. Should you decide to train to stakes, cut back each of the canes grown the previous season to two or three eyes; if to trellis cut each cane to about four feet in length, and bend down in opposite directions, and tie to the lower bar of the trellis to form arms. You may expect this, the third season, a few pounds of grapes to each vine. but it is as well not to allow them to bear too much—a judicious thinning out of the smaller bunches is advisable. It is better not to overload the vine while young, as it will often seriously injure its future growth. Each succeeding season cut back the growth of the preceeding year to two buds, not forgetting in the meantime that a judicious application of fertilizers is necessary to maintain a healthy and vigorous growth.—A. I. Bidwell, 1888.

Foreign Varieties.

If today I wanted to set out a vineyard, no matter how extensive, I should plant no others, but principally certain kinds of Chasselas grafted on Vitis-Aestivalis or on Taylor. I am convinced that such a vineyard would be in flourishing condition after all V. Labrusca and hybrids had exhausted themselves several times. At least all my vines are grafted on different varieties of Aestivalis or on Taylor, and my experience leads me to believe grafted vines are much to be preferred to those grown on their own roots. I do not mean to say that such vines would prove to be a failure; in fact I know Colonel Norton of Eustis, Fla., who is perhaps more successful in growing foreign grapes than myself, grows all of his on their own roots. But with grafted vines we prepare for phylloxera, secure stronger growth, durability, that means long life.—H. von Luttichau.

My advice to the growers of this State will be: Do not confine yourselves to the planting of one single variety, as, no matter how good that variety may be, its period of ripening will be short and compel you to rush your grapes to market in a very limited time. Do with your grapes as you have done with oranges; plant a few varieties ripening in succession. I would recommend the Ives, Delaware and Niagara.

Ives will be the first one ready for mar-

ket, ripening fully two weeks before Niagara (our first Ives shipped this year, on June 29, sold in Philadelphia at twenty cents per pound). Delaware will ripen next, hardly a week later; that is when you are about through with the shipping of the Ives. Fine Delaware will sell about as high as Niagara. (At the present time, September 22, I see on all the stands in New York first-class Delaware grapes retailing at twenty cents; that is, at the same price as the finest Niagaras). When you have disposed of your Delawares the time for your Niagaras has come, so that instead of hurrying the shipping of your crop inside a week, you have about three weeks in which to effectuate your shipments, which permits you to give better attention to packing, sorting, etc., with less danger of having your entire crop ruined by bad weather, should a spell of daily rain occur just when your one variety is ripening.—E. Dubois, 1889.

Pruning for Fruit.

Any manner of trimming, which involves canes or lateral canes of more than two eyes, will result in a barren piece of wood, the terminal eye only sprouting. The first rush of sap will generally pass all intermediate eyes, which not only will lessen the fruiting capacity, but also weaken the vine; all will be exposed to the rays of the sun; much difficulty will be experienced to grow young wood, and it is on such that we get best fruit. Therefore, all fruiting wood should be as close as possible to the main cane, allowing only for space, and new wood should be raised from time to time.

Too much wood or too much fruit—either will prove injurious. Like Delaware, a Vitis Vinifera vine will be forever ruined, perhaps killed, if allowed to overbear, or to bear when not of size, a tendency but too prevailing.

The vine should grow up on the stake unchecked; and here, I will say, I practice no pinching whatever; I used to do so, but have learned better; it may do well anywhere else, but not in Florida. In December I prune the vine to about one foot, if strong enough, and fasten to stake in a somewhat twisted position, better to insure the start of two eyes, and two canes are grown the second summer. December next, one cane is cut to two eyes, the other to twelve inches or about, and fastened, also twisted and slanting as much as possible. This third summer there may appear two shoots on the upper spur, perhaps one in the soil, and the two uppermost eyes on the twelve-inch arm will sprout. The amount of shoots or canes allowed to grow and to fruit now, and especially in the future, will depend on strength and vigor of vine. If four canes have grown and fruited this third summer, more can easily get added, when next trimming, and from now many more will appear as required. The health and future of the vine will depend on the judgment of the grower, who should remove, or rub out all superfluous shoots, when fruit can plainly be seen; what later on may appear, should remain. After the third year, a new cane should be encouraged to grow as near the ground as possible, and the process of trimming is repeated, with the exception, no fruit should be removed of this new cane. When this new cane has its two eyes growing and fruiting, part from the old is removed, which, whenever the new cane has attained size and age, should be removed altogether. I do this as soon as fruit is off, not waiting for next trimming time. Should an old cane apparently give out,

and the new one grows tardily, I remove the old cane at once, as soon as the first flow of sap is over.—H. Von Luttichau, 1892.

The Scuppernong Family.

This type must be pruned in autumn, just after the leaves fall. If pruned later there is danger of destructive bleeding. This method of training places the crop of fruit in easy reach, increases the size of the berries and bunches and insures a larger yield of berries of better quality. The Thomas commences to ripen August 15, thus continuing the supply from the vineyard of other types. Other varieties ripen in succession until the middle of September and furnish fruit until October.

The Memory and Mish are especially desirable, combining hardiness, productiveness and very superior quality.

Without exception the Memory and the Mish were pronounced superior to the Scuppernong. Of ten varieties compared the Memory is the most vigorous grower.

All are free from disease except an occasional very slight attack of black rot. The proximity of diseased vines of other types may have furnished the spores for the disease.

The Scuppernong, James and Jeter, drop so readily from the bunch as to cause great waste in gathering. The stem is attached to the berry externally. The Thomas, Memory and Scuppernong seedlings do not shed so readily, though attached externally. The Flowers, Flowers' Improved, Mish and Tenderpulp adhere firmly to the bunch, having the stem attached internally. These last named varieties can be gathered and shipped in bunches as readily as Concord or Ives.

The Mish and Memory are both rated best as to quality, though they differ in many respects. Both continue long in season.—E. Dubois, 1894.

Pruning the Scuppernong.

The settlement composed of Germans at Ormond are very successful in the growing and cultivating of the Scuppernong grape. The Thomas variety is the one preferred for wine and most generally planted, though the Bronze and a late variety of the same family are planted for a succession. Instructions found in most nurserymen's catalogues are not to prune but our German growers prune severely, and nowhere have I found such hardy, vigorous vines and such quantities of fruit. The pruning is done after the vine becomes dormant, and before it shows signs of putting out again. The vines are first trellised on wires, until they outgrow this trellis, then arbors are built eight feet high, and the vines are not long in covering the top. Vines are set in squares 10x12 feet or the rows are twelve feet and the vines ten feet in the rows. I have never known of a failure, though the crops is better some years than others.—E. W. Amsden, 1894.

FIGS.

Owing to the varying conditions under which different varieties are often grown, even in contiguous localities, it requires additional careful experiments in order to fully determine the comparative value of all varieties to any given section. The white Adriatic has, however, succeeded admirably in many sections of the State, and the tree is an exceedingly strong grower. The Brunswick, above alluded to, is believed to be one of the best. The Celeste, or Celestial, is a very fine variety,

one of the heaviest bearers that we have; and the fruit, though small, is the sweetest of any of the known varieties. The black Ischia, green Ischia, white Genoa and white Marseilles have all done well in the central and northern sections of the State; but as to their adaptability to extreme Southern Florida, we have not been able to obtain as definite information as we would wish.

Transplanting.—In transplanting fig trees we would recommend severe amputation at both ends. The fig has an enormous amount of thickly matted, fibrous roots, and experience has taught us that the severe pruning of these fibrous roots before transplanting is an advantage. By cutting them off to within two inches of the main root, and then cutting off the top of the tree entire, and simply planting this pruned root, we will get a larger and more vigorous tree at the end of the first season than we would by leaving both root and top intact at the time of planting .

In recommending this system of pruning, please bear in mind that we are recommending this treatment for the fig only; and we would further say that while some may object, theoretically, to this practice, a careful trial of the two methods of planting will convince them of the superiority of the method here recommended.

After-treatment.—There are very few fruit trees that will thrive with so little cultivation as the fig, and perhaps none that are so easily damaged by too deep plowing. One light plowing in the spring is benefiical, as is also the keeping down with hoe or cultivator of a too rank growth of weeds and grass. But frequent deep plowing during the season is detrimental, as the fig is a great surface-feeder and will not submit kindly to its roots being disturbed.

The tree delights in a close, compact soil, which, while retentive of moisture, is not wet, and those conditions, if not always readily obtainable, can be perhaps more nearly approached by a liberal use of mulching than in any other way.—G. L. Taber, E. S. Hubbard, H. A. Robie, Committee, 1892.

It can be propagated by seed, by layers and by cuttings, the latter being the easiest and most popular method. These cuttings may be taken from either the old or the new wood in spring, just before the new growth starts, and they will strike root as readily as the grape or the willow. * * * * *

A deep, rich, mellow porous soil, a compost of leaf-mold, ashes and bone-dust scattered over the surface and lightly forked in from time to time, and a heavy mulching of leaves, straw or similar substance spread over the roots as far as the branches extend previous to the coming of hot weather—these furnish the conditions required by the fig.—D. Redmond, 1887.

In 1867 I purchased a home here and found several fig trees in a neglected condition. One large tree of the yellow or light green variety, variously designated as the lemon, white, Smyrna, etc., common to Florida, standing where it received the slops from the kitchen has expanded and borne continuous crops of ten to fifteen bushels. It has increased in size of fruit from its condition as found, and is of uniform shape and size, flattened at the apex, flesh white or yellowish, and altogether resembles the dried fig of commerce.

Other trees of a small, brown variety, called Celeste, brown Smyrna, etc., the earliest ripe and best for table as gathered without preparation—is oblong and smaller than the other. Other trees, found in a dilapidated condition, bear a large, pur-

ple fruit, answering to the Brunswick, which, with proper pruning and manuring I have induced to double its primitive size and continue to bear from June to December, its heaviest yield being in August. The fruit is pear-shaped, and frequently as large as a coffee-cup; it is very prolific, and finds ready market for the table and for preserving. Another variety, in an obscure and wet portion, was found to be the brown Turkey, a solid, compact fruit, with light-brown skin, fine seed and sweet flesh; a better fruit for transportation than any other, but not so prolific.

These four constitute my varieties; all bear annual crops, and in proportion as they are fed and protected against the drought. It is the easiest raised and most certain of all our fruits, and should find a place on every farm and in every garden. It has no insect or fungous enemies that I have known, and my trees that are forty years old are as fresh and vigorous as the younger. I prune and cut away about 25 per cent of the annual wood product.—Ex-Gov. Reed, 1892.

The Himalaya fig is the most vigorous growing tree I ever saw and I believe with Mr. Reasoner, that almost any variety of fig would be successful grafted or budded into that stock. It will resist the root-knot, the greatest and only enemy I have found to my figs. Last August I was very succesful in side grafting two Himalaya trees two to three inches in diameter. A neighbor of mine had a fig bush that bore a purple fig and ripened fruit from May to Christmas. Another neighbor is very successful fruiting the Celeste, the great, or little, fig of the Gulf Coast, where tons of them are preserved yearly for the market. We consider them inferior to our Yellow Smyrna, either for eating fresh or for preserving.

The fig is a fickle tree; some varieties will do well in certain localities and certain soils, where other varieties will fail. We have seen the Yellow Smyrna growing on a high, shell mound; we have seen it die on apparently the same soil. The fig is a lonesome tree; planted near your back door, the barnyard or hen house the chances are it will luxuriate, and drop nectar into your hand. If you have an orange tree near your house that is not doing well, remove it and try a fig tree. Never allow a fig to get hungry from the start. Feed it lime, phosphoric acid and potash; avoid using stable manure or other nitrogenous fertilizers, as these have a tendency to produce soft wood and breed root knot. Pea vines and sweet potatoes also breed the latter. Keep the trees well mulched. Tobacco stems are excellent. Hoe very shallow, as the roots are near the surface.

The fig that we are most successful with on the East Coast is locally called the Yellow Smyrna. I find it answers well to the description of the Lemon. We found it there when we came, probably brought there by the French or Spaniards. The summer of 1894 we had two trees of this variety, the largest of which had a trunk eight inches in diameter, and a spread of limb of thirty feet. From these two trees we filled 400 pint jars of preserved figs, the jars containing from twenty to twenty-four figs each. The trees were frozen to the ground in February, 1895 but immediately sent up new sprouts. I staked the best one on each tree and the second year they bore fruit. I believe in trimming the fig to one trunk, as I do all other fruit-bearing trees.

They are in their prime when they are ready to drop. Although in preserving we pick them twice a day, just before they are ripe, but when they begin to look a little shiny, and underneath the blossom

they turn a little brown, they are just right. We don't think we can ship figs to any market, unless a short distance, to be sold the same day they are shipped. Preserve them in small jars, pints, put them up nice, clean, solid, heavy syrup, make them nice, charge a good price.—C. A. Bacon, 1898.

As evidence of the vital tenacity of the fig, those trees Mr. Bacon speaks of as having seen on top of the shell mounds at New Smyrna, one was brought here in the year 1765, or about that time, by Mr. Turnbull's wife, who was a native of Old Smyrna in Asia Minor, and it has been growing there ever since, until last year when a part of the mound was dug down. I have known that tree for twenty-two years, and I never yet have known it to fail to give a crop. We have other trees, some very much larger than that, on other mounds, some of immense proportions for fig trees. All healthy. They seem to take especially to the high shell mounds near the salt water. They grow as rapidly on some lower ground where there is no shell.—W. S .Hart, 1897.

THE STRAWBERRY.

Strawberries destined to be shipped a thousand miles must be good travelers. The elements of the successful strawberry in Florida are few and plain, and the business of growing it must be conducted with Spartan simplicity. It must be, first of all, hard; second, fresh; third, dry. It must be like a good soldier, trained to endure the privation of a long march with light baggage. We fear that our Northern visitors, accustomed as they are to the gorgeous and luscious berries of their section, will not be greatly impressed by the little, hard, canister-shot specimens which we grow in our Florida sand. Even the best of them are not much bigger than a minnie ball, but like that famous projectile, they carry well. And they fetch the money—which is the root of the matter.

The matted-row system of cultivation is followed only by negligent growers, and that to a limited extent. All the best growers of the State seek to keep their plants isolated in hills. That great enemy of the Southern cultivator, the crab grass, would, in my opinion, render the matted row system unprofitable. Owing to the expense of horse-keep in most places and the necessity for a close hand-to-hand fight with the crab-grass, nearly all the cultivation is performed with wheel hoes and wheel cultivators, supplemented by the common and prong hoes. This hand cultivation permits very close setting of the plants; 20,000 to the acre is the ordinary allowance in calculations in Bradford County.

The writer is better acquainted with the soil in Bradford county than anywhere else in the State; here it is generally the flatwoods, which is low and nearly level piney woods, with a clay subsoil about two feet below the surface, and a soil of sand carrying a high percentage of vegetable matter. This soil is very retentive of moisture, and requires to be bedded up with frequent surface drains or ditches. The same character of the soil causes it also to retain fertilizers well, and renders it excellently adapted to the strawberry. It is found in practice here that a bed three feet wide, containing two rows of plants will give about the best results; but this causes so much waste of land that the beds are made wider, ranging from six to eighteen feet.

In other parts of the State the flat woods soil is not so prevalent; there the dry and sandy nature of the ground is less adapted to bedding up. Beds with frequent ditches between would dry up the plants and curtail the yield in the

spring drought, and the growers more generally set their plants on a level surface.

Planting is generally done in the latter part of August, September and October; the heavy beating rains of the midsummer rainy season, alternating with the hot sunshine, render earlier setting impracticable unless earth is taken up with the plants, which is a slow process. The customary fall drought makes it necessary that the plants should be gotten into the earth as soon as possible after the rainy season ends, in order that they may become well rooted. One plant set in early August is worth four after September 15th.

Holes are punched with a utensil having one or more sharp points; the roots of the plant are placed against one side of the hole, which should remain unbroken to retain moisture, and the earth is pressed with the other hand around the roots. In this sandy soil it is very desirable to have the bed firm; it ought either to be rolled or else made up sometime before hand in order that it may become compacted by the rains.

Fertilizers.

The supply of manure is scarce in Florida; cowchips are about the only available source, and these are full of weed seeds and breed vermin. Hence the best growers depend almost entirely on commercial fertilizers . Cottonseed meal is found to stimulate the growth of foliage, but needs supplementing with potash and phosphoric acid to produce the best results in fruit. As a source of phosphoric acid pure raw ground bone (see Note) is a lasting fertilizer, and is thought to promote fruitfulness; potash imparts firmness to the berries. Plants fed on cottonseed meal seem to be somewhat more exempt from rust than those treated with commercial fertilizers, and this fact, together with the cheapness of the meal, proves delusive to some growers and leads to a sacrifice of fruit and foliage. The same result often happens with horse manure, unless it is thoroughly rotted. In this stimulating climate it is necessary to be careful in the employment of nitrogenous manures in fruit growing.

It is found to be best to apply half or more of the fertilizer broadcast and harrow it in before planting. The rest of it is given in two or three applications, either scattered on the surface or in a slight furrow, and worked in with the wheel cultivator or prong hoe. The amount given during the growing season varies from a half ton to a ton and a half per acre, and it is found that the larger application, if given judiciously, coupled with good management otherwise, is the more profitable in proportion to the expense.

Mulching.

Mulching is more generally employed in Bradford and Duval counties than in the Southern sections, the growers in the latter assert that mulching harbors the vermin and thus works an injury greater than the compensating benefit. Another point is that in the dry and sandy lands of the south mulching materials are less abundant. In Bradford county it is found that an acre of good native wire grass in the more open piney woods, if well mown and raked clean, will mulch an acre of plants. But in practice this is seldom accomplished, since the mowing and raking with machnery in the woods are necessarily very desultory and scattering. It would be difficult to find anything better for this purpose than the wire grass; it is free from seed, fine, tough, flexible, very lasting, and yields an excellent fer-

tilizer when it finally rots supplying the vegetable matter which is much needed in this sandy soil. It is frequently raked off at the close of the picking season, stored up and used a second year. It is generally applied about the end of December it is scattered evenly over the ground covering the plants out of sight. In a few days it settles, showing the outlines of the plants, and these are then rapidly pulled through by expert workmen.

The best growers in Bradford county care very little for February berries, and the January blossoms they would rather see frozen off than not. The birds harvest or at least mutilate most of these early, scattering berries, and even at $1 a quart, they are a nuisance rather than otherwise, as they entail an amount of trampling on the beds which the careful grower regards as more injurious than the fruit is worth. The heavy sandy soil, carrying a light percentage of vegetable matter, which alone will retain sufficient moisture to make strawberry growing successful in this climate, becomes very hard under the constant trampling of a two months' picking season; and the judicious grower, after having got the beds into a light and mellow condition and applied the mulching, would rather lock up his patch and let the birds have all they can find until there are berries enough to amount to something. The main picking in March and April is of much more importance, though it may bring only 25 to 50 cents a quart, than a few "shipments" at fancy prices to be telegraphed over the country, in January and February .

Note.—Acidulated bone is now (1903) generally preferred. Raw ground bone is too slow-acting for strawberries and it breeds many ants in the ground.—S. Powers, 1889.

Different methods are followed in keeping the plants through the summer; some merely keeping down the larger weeds, others in addition plant corn among them, letting the fodder remain on the stalks to shade the plants and claim the corn more than pays for the labor. Some do little or nothing to their plants until August or September, when they clean them out, reset and begin fertilizing and regular cultivation.

We often hear of plants running out. This is no doubt largely owing to growers taking their young plants for setting from their old plantations where fruit has rotted the season before, and in this way getting seedlings. I have found from six to ten around a single old plant. Experts who make a business of originating new varieties by hybridization, think that if from a bed of several hundred seedlings they get one plant worth propagating they are doing well. This would show the risk of setting out seedlings from which to grow a crop.

Probably the best way to avoid this difficulty is the method practiced at the North. Keep the bloom picked from a portion of the plantation, allowing no fruit to set and from these plants get runners for setting. Some growers, after their plants are through fruiting, reset the old plants in a new place and from them get new plants. In either case the land should be well fertilized and kept mellow.—B. H. Alden, 1897.

[Note by S. Powers.—Probably the greatest cause of the deterioration of plants is the practice of making new plantations out of runners from plants which have lately fruited. This double function is straining upon the vitality of the plants, under it they will steadily degenerate and soon "run out." Eschew this

practice by all means, unless you expect to buy a new stock of plants every season.]

The Rust.

The rust is an enemy which the intelligent grower has learned not to dread seriously any more. It is found that where plants are set in August, thus having time to make a large body, and the ground is well filled with a good lasting fertilizer which will hold them up through the winter, even if the rust seizes upon them they will grow out in the first impulse of spring and will fruit abundantly. But where plants receive all their supply of fertilizer close around them in holes or drills, especially if it is not of a durable kind, and are forced into a rapid, soft growth in the fall, they are likely to be stricken with the rust soon after the mulching is applied, and having no reserve of fertilizer distributed at large through the ground to fall back upon, they will go to pieces and make a miserable failure. They may be galvanized into activity again with nitrate of soda, but it will be a sorry day for the grower when he applies this powerful stimulant so late in the season, for the berries will ripen so soft that they cannot be shipped.—S. Powers, 1890.

THE PLUM.

As a general thing, the varieties of plums of Chickasaw type do not fruit very well this far south, and there are but few of this type that I would recommend planting extensively in Florida. The Golden Beauty, although of somewhat recent introduction, has so far proved to be better adapted to Florida than any other of this type. It is a fine plum, and has so far succeeded admirably in North Florida.

Of the Japan type, many varieties have been successfully fruited in the State, and the fruit of Kelsey (the variety that has been planted more largely than any other) has brought very fine prices. Mr. John Fabyan, of Conant, Lake county, informs me that he obtained $8 per bushel at auction in New York, although they were shipped while yet green and hard. The Burbank is a variety that promises to compete with Kelsey for first place among plum growers in Florida, and, in fact, is gaining a wide reputation all through the Eastern States. It is a much later bloomer than Kelsey, hence quite free from danger from late frosts. The fruit is very handsome and possesses an unusually thick, leathery skin, and consequetly is less subject to damage from curculio than most varieties.

Several years ago I planted quite a number of seeds from the Kelsey, and have brought into fruiting about a dozen trees from the seed thus planted. The most noticeable thing about the appearance of these trees, is their almost entire lack of resemblance to either the parent Kelsey or to other named varieties of the Japan type. Not only this, but they vary a great deal between themselves, hardly two of them having the same character of growth, and the fruit on no two of them being alike. It was from one of these seedlings that I obtained more fruit last season than from any other plum of any variety, on my place. The fruit is large (but not as large as Kelsey), round—1 1-2 inches in diameter—color, reddish purple, with heavy blue bloom; flesh, sweet, melting, juicy, and of excellent quality. Ripens early in June. The tree is a very strong grower, symmetrical and handsome. I have named it "Excelsior" and believe it to be an acquisition. From the wonderful diversity in character of growth, but generally good fruit obtained from these dozen Kelsey seedlings, I be-

lieve it will be interesting to those who can do so, to plant seed of any of the fine varieties of the Japan type, and it is more than likely that other valuable varieties might be originated. Of course, orchards planted for commercial purposes (either of plums or other fruit) should be confined to trees of well tested varieties, but in addition to the commercial character of our pursuit, it seems to me that the annual planting of a few carefully selected seed, and the bringing into existence of absolutely new and distinct varieties, possesses a charm that no true lover of horticulture can deny.—G. L. Taber, 1892.

SPRAYING MANUAL.

[The Insecticide department of this chapter was prepared by Prof. H. A. Gossard; the Fungicide department by Prof. H. Harold Hume; the Tabular Guide by both conjointly. The methods of preparing the positions are first given in outline, thoroughly up to date in detail; and these are followed by a tabular guide or syllabus showing at a glance every important tree and plant with its enemies and the treatment of each.—Secretary.]

All the insects mentioned in this manual are divided into two classes; first, the biting or gnawing, and, second, the sucking. Of the first we have familiar examples in grasshoppers, caterpillars, cutworms and beetles; of the second, in squash bugs, chinch bugs, aphides or lice, scale insects, etc. A different class of insecticide is required for each; for the first, one which may be sprayed upon their food plants and eaten by them; for the second, penetrating preparations which kill by contact.

INTERNAL INSECTICIDES.

Nearly all poisons have for their killing principle arsenious acid or white arsenic. This should always be chemically combined with some element that will keep it in suspension in water, never permitting it to go into solution or it will burn foliage. About the only poisons used, other than arsenic, are white hellebore, borax, and phosphorus.

Arsenic Bran Mash.

One pound of white arsenic or 1 1-2 pounds of Paris green mixed with 6 to 10 lbs. of bran or with 15 to 21 lbs. of corn meal with a pound of sugar or syrup, dissolved in just enough water to moisten the mass added, when scattered upon the ground, is fine for cut worms and fairly good for grasshoppers and crickets. Scattered upon cabbage, it is good to destroy cabbage worms.

Arsenite of Lime.

Cheaper than Paris green; equally efficient; cannot be readily adulterated. Used as a spray for all biting insects. When properly made will not burn foliage at ordinary strength.

White arsenic, 1 lb.; lump lime, 2 lbs.; water, 3 gals.

Boil together for a full 1-2 hour after the boiling point is reached; dilute to 200 gals. before applying to foliage. Use fresh, unslaked lime of good quality and before diluting strain through a coarse cloth or sieve to take out the lumps that would otherwise clog the nozzle.

Or perhaps a better formula is as follows:

White arsenic, 2 lbs.; sal soda, 8 lbs.; water 2 gals.

Boil all together for 15 minutes or till the arsenite dissolves. This is labeled "poison" and kept as a stock solution. One pint of it and 2 lbs. of freshly slaked

Use fine nozzles, such as the Vermorel in making applications of all arsenical sprays.

Paris Green.

When not adulterated, a good poison. Some of that on the Florida market is not worth carrying home. Good Paris green should contain between 55 per cent and 60 per cent of arsenious acid of which not more than 4, or at most, 5 per cent should be free, otherwise foliage will be scorched. Gypsum is often used as an adulterant. To test for gypsum, take 1-4 teaspoonful and add to a drinking glass of water, stir well and add 6 tablespoonfuls of ammonia, stirring for 5 minutes. If sample is correct, no undissolved residue will remain in the water.

Paris green, 1 lb; water, 160 gals.; lump lime, (freshly slaked) 2 lbs.

For sensitive foliage, such as peach and bean, use 200 gals. of water instead of 160. The poison is always first put in a small quantity of water and thoroughly mixed, after which it is diluted to the full amount. The liquid should be kept agitated while the spray is being applied to prevent the poison from settling to the bottom. Very generally used with Bordeaux mixture which destroys all its burning qualities.

Sometimes Paris green is applied as a powder, either by shaking a strong cheese-cloth sack over the plants or by using some such powder gun as Leggett's Champion Duster. The Jumbo Sprayer could be used on quite large trees but the powder is recommended chiefly for low growing plants. Dilute the Paris green with about 20 times its weight of flour or of lime for using as a powder. Flour is better than lime because it sticks the poison to the leaves and is not distasteful to the insects.

Resin-Lime-Paris Green Mixture.

In spraying with the arsenites, other than arsenate of lead, upon smooth-leaved plants, such as cabbage and cauliflower, it is often difficult to make the poison adhere. By using the following preparation a persistent, adhesive spray is obtained.

Pulverized resin, 5 lbs.; concentrated lye, 1 lb.; fish oil, 1 pt.; water, 5 gals.

Heat the oil and resin with a gallon of water until the resin is softened; add the lye and remaining 4 gals. of water and boil for 2 hours or longer. Add enough water to make 5 full gallons of this stock solution. For use, take of this resin mixture 1 gal.; add 3 gals. of white-wash, 1-4 lb. of Paris green and 16 gals. of water .

Green Arsenoid or Scheele's Green Paragreen.

Use like Paris green; finer powders than Paris green and remain better in suspension in water; are also cheaper and equally effective.

Arsenate of Lead.

Completely insoluble in water and will cause no harm to the tenderest foliage. It is also very persistent in remaining upon foliage for long periods of time, even when drenched by hard rains. If applied on a fair day so it has time to dry on the foliage it will adhere for months. Needs some stirring while being applied but not so much as Paris green. Two excellent brands of the prepared material are upon the market, Bowker's Disparene and Swift's Arsenate of Lead. Use from 3 to 5 lbs. to 50 gals. of water. Not so poisonous as other arsenites and must be used in stronger mixtures.

To prepare arsenate of lead, dissolve 4 oz. of arsenate of soda and 11 oz. of acetate of lead in 1 or 2 gals. of water and

dilute to 100 gals. for use. Stock solutions should not be kept very long. Like Paris green, it can be used with Bordeaux mixture.

White Hellebore—Pyrethrum.

Loses its poisonous properties after being exposed to the air a few days and therefore can sometimes be used to advantage upon fruits or plants that are soon to be eaten. Must be kept in tight receptacles and should not be kept too long before being used. Is especially useful against slugs or the larvae of sawflies. Apply as a spray in the evening (many worms feed at night), 1 ounce in 3 gals. of water, or as a powder with a blowgun, or from a cheese-cloth sack. Pyrethrum or Persian insect powder may be applied in the same way and for the same purposes, though it kills by a different principle.

Contact Insecticides .

Whale Oil Soap .

One of our safest and most effective applications. Useful against all forms of plant lice and scale insects. Upon the market are found hard whale oil soaps and soft soaps. The hard soaps have caustic soda for their alkaline constituent, while caustic potash furnishes the base for the soft soaps. Potash forms a stronger chemical union with fatty acids than caustic soda and hence potash hydroxid or lye is less apt to separate out from a potash soap spray than is sodium hydroxid from a soda soap spray. Hence there is less likelihood of damage to plant tissues from the potash soaps. Potash soaps have given much better results on orange trees especially than the soda soaps. Potash is also a fertilizer and possibly acts as a stimulant to plants when applied in even such small quantity as is contained in a soap spray.

Of the hard soaps upon the market one of the best brands is Leggett's Anchor soap, made by Leggett & Bro., 301 Pearl St., N. Y. Leggett also makes some fairly good soft soaps. No better potash soap is made than Good's Potash Whale Oil Soap No. 3, manufactured by James Good, 939 North Front St., Philadelphia, Pa. It is specially recommended to orange growers. For soft-bodied insects, as plant lice, use one pound in 6 or 7 gals. of water; for scale insects, white fly etc., on orange, peach, and hard-wood trees, use 1 pound in 3 or 4 gals. of water.

The following is a formula given by Lodeman for making a whale oil soap:

Potash lye, 1 lb.; fish oil, 3 pts.; soft water, 3 gals.

Dissolve the lye in boiling water, then add the oil and boil for at least 2 hours longer. For insects such as plant lice use this soap at the rate of 1 pound in 9 or 10 gals. of water; for scale insects, 1 pound in 5 to 7 gals. of water.

Thrip Juice.

Hammond's Thrip Juice, made by Benjamin Hammond at Fishkill-on-the-Hudson, N. Y., is seemingly a very concentrated potash-tar soap and has given good satisfaction with many orange growers when used against scale insects. It is diluted with 1000 parts of water.

Kerosene Emulsion.

A very penetrating insecticide—one of the most efficient against all sucking insects.

Soap, hard, chipped, 1-2 lb.; or soft whale oil soap, 1 qt.; water, 1 gal.; kerosene, 2 gals.

Whale oil soap is to be preferred but

ordinary laundry soap may be used. Dissolve in 1 gal. of boiling water and while soap solution is boiling hot pour into it, away from the fire, 2 gals. of kerosene. Commence agitation immediately with a force pump, pumping the liquid back into itself until a thick creamy mass is obtained. If the emulsion does not form within 10 or 15 minutes the whole may be reheated to the boiling point over a fire out of doors. Should the mixture be allowed to boil over it will catch fire. Soft clean water should be used from which all dirt particles have been removed. If only hard water is available, it should be broken with lye before being used. Dilute the emulsion obtained from the above formula with 27 gallons of water or 9 parts of water to one part of emulsion for scale insects; for plant lice, it may be diluted twice as much. If the emulsion is well made, it can be kept for months as a stock preparation in closed jars. For tender plants, dilution should be one part of the emulsion to 15 or 20 of water.

Kerosene sprays should not be allowed to collect about the crowns of trees or plants to which they are applied. Bright, sunshiny days should always be chosen for making kerosene applications so the volatile oils will evaporate at once. In our humid climate even a much diluted emulsion, if used on a cloudy day at the beginning of a cloudy week, is liable to cause disastrous results, especially to tender vegetation and citrus trees. Use a fine Vermorel nozzle in making kerosene applications .

Mechanical Mixtures of Kerosene or Petroleum.

Of the Kerowater pumps designed to effect a given dilution of oil with water at the time of application, the Gould Kerowater pumps and the Spramotor pumps are the only ones that can be recommended at all, and these must be often tested while in use to ascertain if the actual percentage of oil being thrown tallies with the setting of the guage. This is done by pumping a small quantity of the liquid into a graduated glass tube and waiting for the oil and water to separate. When set at 10 or 15 per cent. these machines are often found to be throwing from 20 to 30 per cent. of oil. They are chiefly useful in fighting San Jose scale.

Crude petroleum having a specific gravity of from 43 degrees to 45 degrees on the Beaume scale, when diluted from 20 to 25 per cent. with water is excellent for San Jose scale if applied during the winter months while the trees are devoid of leaves. Crude petroleum must not be used on trees in leaf or upon evergreen trees. A few growers report the satisfactory use of Kerowater pumps in orange groves but because of their unreliability in mixing a definite percentage of oil, great caution should be observed in using them in this way. The regular emulsion is much safer to use upon any tree or plant in leaf. Use all the precautions given in the paragraph upon kerosene emulsion. Always apply with a fine Vermorel nozzle.

Resin Wash.

Resin pulverized, 20 lbs.; caustic soda, 98 per cent. 4 1-4 lbs.; fish oil, 3 pts.; water, 30 gals.

Put all the ingredients in a large iron kettle and cover with 15 gals. of water; boil for 2 or 3 hours. If cooking is incomplete, the wash will be exceptionally injurious in its effects and if applied to young fruit after being hastily prepared, the results are liable to be disastrous. Add warm water from time to time while

cooking, thus increasing the stock solution to 30 gals. before boiling ceases. Never add cold water to resin wash while cooking; warm but not boiling water, added when boiling over is threatened, will cause subsidence. Dilute the 30 gals. of stock solution to 100 gals. for use as a winter spray or to 150 gals. for a summer spray. Three or 4 applications of this spray to citrus trees within so short a period as 3 or 4 months give the tree a severe shock. Two thorough applications during winter and 1 in summer are about all that trees should be expected to stand. It is best not to use it at all upon trees carrying young fruit. This wash is used for scale insects, plant lice and especially for white fly. The application should be made with a coarse nozzle.

Lime-Salt-Sulphur Wash.

Very effective against scale insects on deciduous trees while dormant. Sometimes used in winter on trunks and larger limbs of orange trees.

Lump lime, unslaked, 30 lbs.; sulphur, 20 lbs.; salt, 15 lbs.; water, 60 gals.

Place 10 lbs. of lime and 20 lbs. of sulphur in a boiler with 20 gals. of water and boil over a brisk fire for not less than 1 1-2 hours or until the sulphur is thoroughly dissolved. When this takes place the mixture will be of an amber color. Next place in a cask 20 lbs. of unslaked lime, pouring over it enough hot water to thoroughly slake it; and while it is boiling, add the 15 lbs. of salt. When this is dissolved add to it the lime and sulphur in the boiler and cook for 1-2 hour longer, after which the necessary amount of water to make the 60 gals. should be added. If wooden barrels or tanks are used and a head of steam is available, pipes may be conducted through the receptacles and boiling can then be very satisfactorily accomplished by means of steam. The spray is best applied while hot. Pumps should be thoroughly cleansed by having pure water pumped through them after the use of this wash; otherwise they will corrode. Use a coarse nozzle for applying this wash. A good brand of prepared lime-salt-sulphur wash is sold by the Adler Color and Chemical Works, 100 William St., N. Y., under the trade name of Calcothion.

Bisulphide of Lime.

Flowers of sulphur, 5 lbs.; lump lime, unslaked, 5 lbs.; water, 4 gals.

Boil all of these ingredients together until they combine, forming a brownish liquid. This is to be diluted to 100 gals. for use. Use for six-spotted mite, rust mite and red spider; quite effective against these insects but is also a great fungicide, destroying the diseases that keep scale insects in check; hence, when used in an orange grove, excessive multiplication of scale insects is almost certain to follow. When used upon orange, follow in two or three weeks with some penetrating insecticide, such as whale oil soap or Thrip Juice. Not very effective for purple mite; most valuable for red spider on garden plants.

Soda-Sulphur Spray.

Caustic soda, 98 per cent., 10 lbs.; sulphur, 20 lbs.; water 20 gals.

Mix the sulphur to a paste, not sloppy, with cold water in a barrel; add to this wet sulphur 10 lbs. of caustic soda and as it boils add gradually, but without delay, 20 gals. of water to prevent its burning. This is the stock solution; when ready to spray put 40 gals. of water in another barrel and stir into it 1-2 gal. of the stock solution from which all sediment has been removed by straining. Used against pur-

ple mite, six-spotted mite, rust mite, young scale and the newly hatched larvae of white fly.

Whale Oil Soap Sulphur Spray.

One of the best applications for purple mite and six-spotted mite; scale decreases instead of increasing following its use. Purple mite readily succumbs to this application while it is quite resistant to either sulphur dust or lime-sulphur spray.

Potash whale oil soap, 10 lbs.; flowers of sulphur, 1 qt.; water, 15 gals.

Boil until the sulphur is dissolved or from 30 minutes to 1 hour. Add water to make 35 or 40 gals. of spray. Especially useful to orange growers.

Sulphur Dust.

1-2 sulphur dust and 1-2 lime dust, mixed, or a combination consisting of 1-3 by bulk of flowers of sulphur, 1-3 tobacco dust and 1-3 lime dust are often used for rust mite, the application being made with Leggett's Jumbo Sprayer. The application is useful when alternated with a liquid spray designed to kill scale but if used exclusively is generally followed by an excessive multiplication of scale. A dusting made in this manner requires less time and labor than does a liquid application.

Tobacco.

Tobacco dust mixed with the fertilizer is very generally used by pineapple growers for the control of mealy bugs.

Tobacco decoction is made by boiling 1 lb. of stems or of dust in 2 gals. of water until a dark brown liquid is obtained. When boiling is finished, add water to make 2 or 3 gals. of solution. If the dust is used, strain out the sand particles to prevent clogging of the pump nozzle. The solution will not harm the tenderest foliage and is effective against plant lice.

Carbon Bisulphide Fuma.

A volatile liquid whose fumes are heavier than air. When mixed with air the fumes are very explosive and no fire of any kind should be brought near them. For fumigating a building containing growing plants not more than 1 pint to 1,000 cubic feet of space should be used. To destroy weevils in grain in tight bins use about 1 lb. to the ton of grain or to each 1,000 cubic feet of space. It may be put in shallow containers which are placed on top of the grain or the liquid can be poured directly on the grain. If bins are somewhat open, cover with a blanket. Fumigate for 24 to 30 hours, after which the bins should be thoroughly aired. No live stock should be left in a building which is being fumigated. Beware of the lighted cigar around this gas.

Fungicides.

It should be borne in mind that applications of fungicides are made more as a matter of prevention than of cure. If a disease is known to have been prevalent in the section or on the trees the season before, holding in mind the time of its appearance, it is best to take time by the forelock and make applications of fungicides even before the disease in question attacks the crop. But too frequently spraying is neglected until the disease has gained such headway that it is impossible to check or stay its ravages, and the whole crop is lost in spite of conscientious and painstaking efforts. Then spraying is often said to be of no service, when in reality, the grower is at fault.

If, after an application of a fungicide, a heavy rain sets in, the mixture will be

washed from the leaves of the plant and little may be expected in the way of results. Twenty-four hours or preferably more, must elapse before results can be expected.

The person who sprays spasmodically need not expect the best results. It must be done thoroughly, at proper intervals, and in no case should it be postponed, if the best results are to be expected. If, for instance, applications are to be made each week, then on a certain day the spraying should be done; yes, and done as often as the day comes on. If the weather is not propitious, then make the application as soon as the conditions are right.

A knowledge of the disease, its nature and mode of attack is essential. The grower should know how it spreads, on what part of the plant it develops, whether it is difficult to control or not, and many other points regarding it. Such a knowledge is not always readily at the command of the grower but a good specimen of the diseased plant or part of a plant forwarded to the Experiment Station will elicit the necessary information along these lines.

Many mixtures have been recommended and used for the control of fungi. Many compounds under various names have been placed, and still are on the market, but it must be said of fungicides that they may be prepared as cheaply and as well at home. As a matter of fact, the home-made mixtures are generally superior and are the only ones recommended by the writer.

Bordeaux Mixture.

Bordeaux mixture for ordinary plants in leaf. For general spraying the 6-4-50 formula is most serviceable.

Copper sulphate, 6lbs.; quick lime, 4 lbs.; water, 50 gals.

For peaches and Japan plums in leaf and other plants likely to be injured by the stronger mixture.

Copper sulphate, 3 lbs.; quick lime, 6 lbs.; water 50 gals.

To preserve lime, empty the barrel of lime as soon as received into a kerosene barrel and add enough water to slake and reduce the lime to a paste of the consistency of putty. Keep the lime in the barrel covered with two or three inches of water and keep the barrel covered with boards to prevent evaporation. Always keep the lime covered with water.

If much spraying is to be done, it is always preferable to make stock solutions. This is done by measuring out a definite quantity of water, say 25 gals., into each of 2 barrels. Into the first of these put 50 lbs. of copper sulphate (blue vitriol.) Into the second 25 gals. put 50 lbs. of lime paste mentioned above, or a little more to make allowance for the water contained in it. The copper sulphate should not be thrown into the barrel as it will not then dissolve readily, but it should be suspended under the water in a coarse sack hung from a stick laid across the barrel. When thoroughly agitated 1 gal. of Solution No. 1 will contain 2 lbs. of copper sulphate, and 1 gal. of Solution No. 2 will contain approximately 2 lbs. of lime.

As a matter of fact, but few of those who use Bordeaux mixture prepare it properly. The underlying principle in the making of a good uniform mixture of a deep blue color and one that will stick to the foliage like paint, is that the copper sulphate solution and the lime solution should both be well diluted before mixing.

To prepare the mixture, dip out 3 gals. of the copper sulphate solution and dilute it in a barrel with 22 gals. of water. If the lime is measured by weight reduce it to a thin paste, place it in a second barrel with enough water to make 25 gals. Thoroughly agitate these two solutions in their respective barrels, then pour them together in the barrel of the spray pump, taking a bucketful from each, alternately.

If too small an amount of lime is used injury may be done the foliage, hence the mixture should be tested and more lime added if necessary. Three tests are in common use.

1. Dip a clean steel blade into the mixture; if a thin film of copper coats the surface after a minute or so, more lime must be added.

2. Pour out some of the mixture into a shallow dish and hold it up between the eyes and the light. If properly made a thin pellicle will be seen on the surface.

3. Dissolve 1 oz. of ferrocyanide of potassium in 6 oz. of water. Take out a small amount of the mixture in a shallow white porcelain dish. Drop into it a drop or two of the ferrocyanide potassium solution and if a brownish-red coloration is seen, more lime must be added; otherwise the mixture is all right. An excess of lime is not injurious.

Bordeaux mixture is objectionable on ripening fruit, and blossoms; the color is hard to remove and people regard it suspiciously. There is no danger in using fruits or vegetables colored by it but for the sake of appearance it is best to use the following mixture on ripening fruits or on vegetables of which the fruit is the part used.

Copper carbonate, 5 oz.; strong ammonia, 3 pts.; water, 50 gals.

Reduce the copper carbonate to a paste in a small quantity of water, add sufficient of the ammonia to dissolve the copper carbonate. This may be kept in a tightly corked glass bottle and used, diluted as above.

Copper Acetate Solution.

Dibasic copper acetate, 6 oz.; water, 50 gals.

Procure finely pulverized acetate of copper, reduce to a paste with water, then dilute with 50 gals.. Sometimes used on peaches.

The following is a list of companies that may be consulted by prospective purchasers or by those interested in spraying: Gould Mfg. Co., Seneca Falls, N. Y.; William Stahl, Quincy, Ill.; Deming Co., Salem, Ohio; "Friend" Mfg. Co., Gasport, N. Y.; Field Force Pump Co., Lockport, N. Y.; Morrill & Morley, Benton Harbor, Mich.; Hardie Spray Pump Co., Detroit, Mich.; F. E. Myers & Co., Ashland, Ohio; Spramotor Co. London, Ontario and Buffalo N. Y.

TABULAR GUIDE.

PLANT.	DISEASE.	REMEDY.	HOW USED.
BEANS.	Anthracnose or Brown spot (Colletotrichum Lindemuthianum).	Bordeaux Mixture and Ammoniacal Solution.	Soak seed for one day. Spray every week or ten days.
	Rust (Phyllosticta Phaseolini) Blight (Sclerotium, Sp.)	Ammoniacal Solution.	Spray every week or ten days. Spray the ground about stems once every week or ten days.
	Weevil (Bruchus obtectus).	Bisulphide of Carbon.	Place in air tight chamber and fumigate for 30 hours.
	Army Worm (Laphygma frugiperda).	Paris Green.	Spray. Do not use pods for food until three or four weeks after spraying.
	Leaf Hoppers (Empoasca, etc.).	Fire and clean culture.	Burn all vegetation on the field before planting. Eggs are in this vegetation during the winter.
CABBAGE AND CAULIFLOWER.	Blight (Sclerotium, Sp.).	Ammoniacal Solution.	Spray ground close to the stems once every week or ten days.
	Downy mildew (personospora parasitica) in seed beds.	Bordeaux Mixture and sulphur.	Keep surface dry; water in middle of day; scatter sulphur on ground or spray with Bordeaux Mixture.
	Worms (Butterfly larvae Sp. of Plusia, Pieris, Plutella, etc.).	Poisoned bran bait thrown on the leaves or on the ground. Resin-Lime-Paris Green mixture. Green Arsenoid, Arsenate of Lead or other arsenical spray. Pyrethrum.	Use the arsenical poisons until the plants begin to head, after which use Pyrethrum.
	Cut-worms.	Poisoned bait of bran or corn meal.	Scatter poison over plowed field two or three days before planting. Keep scattered over field while plants are young.
	Harlequin bug or Calico Back. (Murgantia histrionica.)	Hand-picking. Kerosene Emulsion.	When numerous, spray with Kerosene Emulsion.

TABULAR GUIDE.---Continued.

PLANT.	DISEASES.	REMEDY.	HOW USED.
CABBAGE AND CAULI-FLOWER. (Continued.	Plant lice (Aphis brassicae).	Whale Oil Soap; Kerosene Emulsion; Resin Wash; Tobacco Decoction; Pyrethrum Decoction.	When necessary use one of these sprays. Because of odor, use Pyrethrum or resin wash when plants begin to head.
CANTA-LOUPE.	Leaf Spot (Macrosporium cucumerium). Blight (Sclerotium Sp.).	Bordeaux Mixture. Ammoniacal Solution on ripening fruits. Same as for cabbage.	If locality is subject to disease, commence spraying as soon as the vines commence to run, then once every week or two weeks as weather conditions render necessary.
	Plant lice (Aphis gossypii.)	Whale Oil Soap; Resin Wash; Kerosene Emulsion; Tobacco Decoction.	Spray when necessary.
	Melon worm (Margaronia hyalinata).	Arsenate of Lead; Cantaloupes are too tender for the other arsenicals. Rotation of crops, clean culture and fire.	Spray early. Use squash as trap crop. Burn all dead vines and vegetation after crop is removed. Very early crops are troubled less than later ones.
	Pickle worm (Margaronia nitidalis.)	Arsenate of Lead. Trap crops and rotation; clean culture and fire.	Spray early. Plant hills of squash in field and collect and destroy larvae often. Plant new trap crop once every two or three weeks. Burn old vines.
	Striped cucumber beetle (Diabrotica vittata.) 12-spotted cucumber beetle (Diabrotica 12-punctata).	Arsenate of Lead. Trap crops. Tobacco stems. Bordeaux.	Squash for trap crop. Spray main crop with Bordeaux as repellant; Tobacco stems around plants as soon as they come up.
CELERY.	Blight (Cercospora apii). Leaf spot (Septoria Petroslini var apii). Center Blight (Bacterial?). Drop (Sclerotinia libertiana).	Bordeaux Mixture. Bordeaux Mixture. Bordeaux Mixture. Rotation.	For all these diseases spray plants in seed bed as soon as they appear. Spray once every week or two weeks until crop is boarded for bleaching.
	Cut worms.	Same as for cabbage.	Same as for cantaloupe.
CITRUS:	Sour orange or Lemon scab (Clados-	Bordeaux Mixture.	Spray as soon as blossoms drop. Give

CITRUS: ORANGE. POMELO. LEMON. LIME.	Sour orange or Lemon scab (Cladosporium, Sp.).	Bordeaux Mixture. Ammoniacal Solution.	Spray as soon as blossoms drop. Give two or three other applications at intervals of two or three weeks.
	Foot rot (Fusisporium Limonii).	Sulphurous acid and water. Use resistant stocks; avoid sweet stocks.	Remove ground; admit air and light; apply mixture.
	Die-back.	Potash and phosphoric acid fertilizers Little or no cultivation.	If Bordeaux Mixture is used, follow with application of Good's Potash Whale Oil Soap No. 3, for scales.
	Melanose.	Bordeaux Mixture. Ammoniacal Solution.	
	Sooty mold (Meliola Sp.).	See section on insects, especially on white fly.	A good potash whale oil soap used 4 or 5 times per year generally gives most satisfactory results.
	Scale insects.		One spraying in March or April, another in June or July and a third in September or October is advised.
	Purple (Mytilaspis citricola).	Potash Whale Oil Soap.	One or two additional sprayings can be given in winter.
	Long (Mytilaspis gloverii).	Thrip Juice. Resin wash.	The treatment as here outlined applies especially to the purple and long scale.
	Red (Aspidiotus ficus);	Kerosene Emulsion.	If followed, the other scales will give no trouble. Sooty mold disappears with the destrution of the insects which cause it.
	Chaff (Parlatoria pergandii). White wax (Ceroplastes floridensis); Turtle back (Lecanium hesperidum); Mealy bug, (Dactylopius citri), etc.		
	Cottony Cushion scale, (Icerya purchasi).	Australian lady bug.	Procure a colony of lady bugs from Clearwater, Fla., and liberate in the infected grove.
	Rust mite (Phytoptus oleivorus).	Sulphur dust. Caustic soda sulphur solution. Whale oil soap, sulphur spray.	Apply sulphur as a dust or in some form of spray every three or four weeks during the fruiting season.
	Purple mite (Tetranychus mytilaspidus).	Whale oil soap sulphur spray. Soda-Sulphur spray. Irrigation.	Spray every two weeks until the mites are under control.
	Six-spotted mite (T. 6-maculatus).	Same as for purple mite.	Same as for purple mite.
	White fly, (Aleyrodes citri).	Resin wash. Whale oil soap. Thrip Juice. Kerosene emulsion. Caustic soda sulphur solution.	Spray twice with resin wash or whale oil soap in winter. During summer spray with soap, Thrip Juice or soda solution of sulphur.

TABULAR GUIDE.---Continued.

PLANT.	DISEASE.	REMEDY.	HOW USED.
CORN (Sweet).	Budworm, (Heliothis armigera).	Paris green. Green arsenoid.	Dust in tassel and silk.
CUCUMBER.	Downy mildew (Plasmopora cubensis).	Bordeaux Mixture.	Spray as soon as spots commence to appear on leaves at the hill. Afterward give application once every week or ten days. Let spray strike under sides of leaves.
	Anthracnose (Colletotrichum lagenarium).	Bordeaux Mixture.	Same as for downy mildew.
	Plant lice, pickle-worm, spotted beetle, striped beetle.	Same as for cantaloupe.	Same as for cantaloupe.
EGG PLANT.	Leaf and fruit spot, (Phyllosticta hortorium).	Bordeaux Mixture. Ammoniacal Solution.	Spray once every ten days.
	Blight (Sclerotium, Sp.);	Ammoniacal Solution.	Spray the ground thoroughly about the stems as soon as disease appears.
	Bacterial Blight (Bacillus solanacearum).	Rotation and remove diseased plants.	
	Aphis.	See cabbage.	
GRAPE.	Black rot, (Coestadia bidwellii).	Bordeaux Mixture.	Spray thoroughly from time fruit sets, once every week.
	Louse.	See cantaloupe.	
	Thrips.	Whale oil soap solution.	
GUAVA.	White fly (Aleyrodes floridensis).	Whale oil soap. Resin wash.	Spray thoroughly while in the larval state or when no adults are flying. Give two or three applications per season.
LETTUCE.	See celery.		
ONION.	Thrips, Sp.	Potash whale oil soap. Roseleaf Insect-(Apply as a spray)	

ONION.	Thrips, Sp.	Potash whale oil soap. Roseleaf Insecticide. Decoction of pyrethrum.	Apply as a spray as soon as the insects appear; repeat often.
PAPAW (Melon).	Leaf spot (Scolecotrichum Caricae).	Bordeaux Mixture.	Spray once every week or two.
	White fly.	See guava.	
PEACH.	Fruit spot (Cladosporium carpophilum).	Bordeaux Mixture. Ammoniacal Solution.	Spray as soon as fruit has set. Then once each week or ten days thereafter.
	Brown Rot, (Sclerotinia fructigena).	Bordeaux Mixture. Ammoniacal Solution.	In orchards where disease has appeared, give trees one application of Bordeaux before flowers open. After petals fall, once a week or ten days.
	Shot hole fungus, (Septoria cerasina).	Bordeaux Mixture. Ammoniacal Solution.	Give first application when leaf buds open, thereafter once every week or ten days.
	Crown gall.	Discard all affected trees. Purchase stock from clean nurseries.	
	Root rot, (Clitocybe parasitica).	Dig and burn all affected trees.	
	San Jose scale (Aspidiotus perniciosus).	Mixture of crude petroleum, 20 per cent. with 80 per cent. water. Lime-salt-sulphur spray.	Apply with spramotor or Gould Kerowater pump once or twice in winter. Apply in winter.
	White peach scale (Diaspis pentagona). Gopher scale (Aspidiotus juglansregia).	Kerosene emulsion or kerosene 15 per cent. with Kerowater pump. Whale oil soap.	Use in summer, April, May or June when necessary.
	Curculio, (Conotrachelus nenuphar).	Jarring. Pigs.	Fence each tree and pasture the pigs in the orchard during the fruiting season.
	Peach louse (Myzus cerasi).	Whale oil soap. Kerosene emulsion. Resin wash.	Spray when needed.
PEAR.	Blight (Micrococcus amylovorus). San Jose scale. Gopher scale.	Dig and burn or pruning. See peach.	Not successfully controlled in Florida.

TABULAR GUIDE.---Continued.

PLANT.	DISEASE.	REMEDY.	HOW USED.
PEA.	Mildew.	Bordeaux Mixture.	Spray every ten days.
	Weevil (Bruchus, Sp.) in dry peas.	Carbon bi-sulphide.	Fumigate in closed chamber for 30 hours.
PECAN.	Leaf spot (Cercospora, Sp.).	Bordeaux Mixture.	On unfolding leaves, then at intervals of three weeks; 4 applications.
	Husk blight (Fusicladium, Sp.),	Bordeaux Mixture.	On young fruit soon after setting and afterward as for leaf spot.
	Twig girdler (Oncideres cingulatus).	Fire.	Gather twigs in winter and burn.
	Fall web worm (Hyphantria cunea).	Fire. Arsenical poison.	Elevate blazing pine-knot under the nest. If very numerous, spray when they first appear.
	Bud worm.	Arsenite of lime. Paris green. Arsenate of lead or other arsenical spray.	Apply during dry weather in August or September, or in the spring when buds are swelling.
	Case worm (Mincola juglandis).	Same as for bud worm.	
	Twig borers (Elaphidion, Sp., etc.).	Fire.	Collect infested twigs and burn.
PINE-APPLE.	Mealy bug (Dactylopius adonidum).	Tobacco dust. Pyrethrum.	Mix with the fertilizer and apply.
	Red spider (Stigmaeus Floridanus).	Tobacco dust.	Dust freely into infested leaves.
PLUM.	See peach.		
POTATO (Irish).	Early blight, (Altenaria solani).	Bordeaux Mixture.	Spray once every week.
	Late blight, (Phythophora infestans).	Bordeaux Mixture.	Spray once every week.

POTATO (Scab (Oospora scabies)

POTATO (Irish). (continued).	Scab (Oospora scabies).	Corrosive sublimate solution. Formaldehyde. Use clean seed Rotation	Soak seed from one to two hours.
	Sterile fungus (Rhizoctonia).	Corrosive sublimate solution. Use clean seed. Rotation	Soak seed two hours.
	Bacterial blight (Bacillus solanacearum).	Rotation Use clean seed.	
	Blister beetles (two or three species of Epicauta).	Arsenical poison.	Spray when insects are numerous. Repeat if necessary.
SQUASH.	Squash bug (Anasa tristis).	Hand-picking. Clean culture.	Pick by hand and destroy both adults and eggs. Burn all old vines. Occasional dressing of nitrate of soda will help plants to stand drain.
	Squash-vine Borer (Melittia satyriniformis).	Rotation of crops. Knife.	Cut out borers with knife. Burn all vines that are done bearing.
	Pickle worm, melon worm, striped beetle, spotted beetle.	See cantaloupe.	
STRAWBERRY	Leaf spot (Sphaerella fragariae);	Bordeaux Mixture.	Spray as soon as spots appear, then once every week until checked, then once every two weeks as a preventive
	Thrips (Thrips tritici).	Roseleaf Insecticide. Tobacco decoction.	Spray every three or four days while blooming.
	Strawberry pamera (Pamera vincta).	Kerosene emulsion. Roseleaf Insecticide.	Spray with kerosene emulsion in early part of season. Use Roseleaf after fruit is partly grown.
	Leaf footed plant bug (Leptoglossus phyllopus).	Handpicking. Destroy thistles and sunflowers in the near neighborhood.	
	Strawberry flea beetle(Haltica ignita).	Arsenical spray.	Apply after the fruiting season.
TOMATO.	Black Rot, (Altenaria solani).	Bordeaux Mixture.	Spray once every week.
	Leaf blight (Cladosporium fulvum).	Bordeaux Mixture.	Spray once every week.

TABULAR GUIDE.---Continued.

PLANT.	DISEASE.	REMEDY.	HOW USED.
TOMATO (Continued)	Leaf spot (Septoria lycopersici).	Bordeaux Mixture.	Spray once every week.
	Blight (Sclerotium, Sp.).	Bordeaux Mixture. Ammoniacal solution.	Spray ground thoroughly about vines as soon as it appears.
	Bacterial blight, (Bacillus solanacearum).	Rotation. Resistant plants. Gather and destroy diseased plants.	
	Blossom end blight (Bacterial).	Rotation.	Gather and burn affected fruits.
	Tomato fruit worm, (Heliothis armigera).	Handpicking. Poison bran mash or corn meal mash.	Pick and destroy wormy fruits. Scatter poison mash over the vines.
	Horn worm (Phlegethontius carolina).	Handpicking.	
	Tomato louse (Megoura solani).	Same as for cantaloupe.	Same as for cantaloupe.
	Soldier bugs (various species, fam. Pentatomidae).	No remedy except handpicking and clean culture.	Pick in morning or on cool cloudy days when bugs are stupid.

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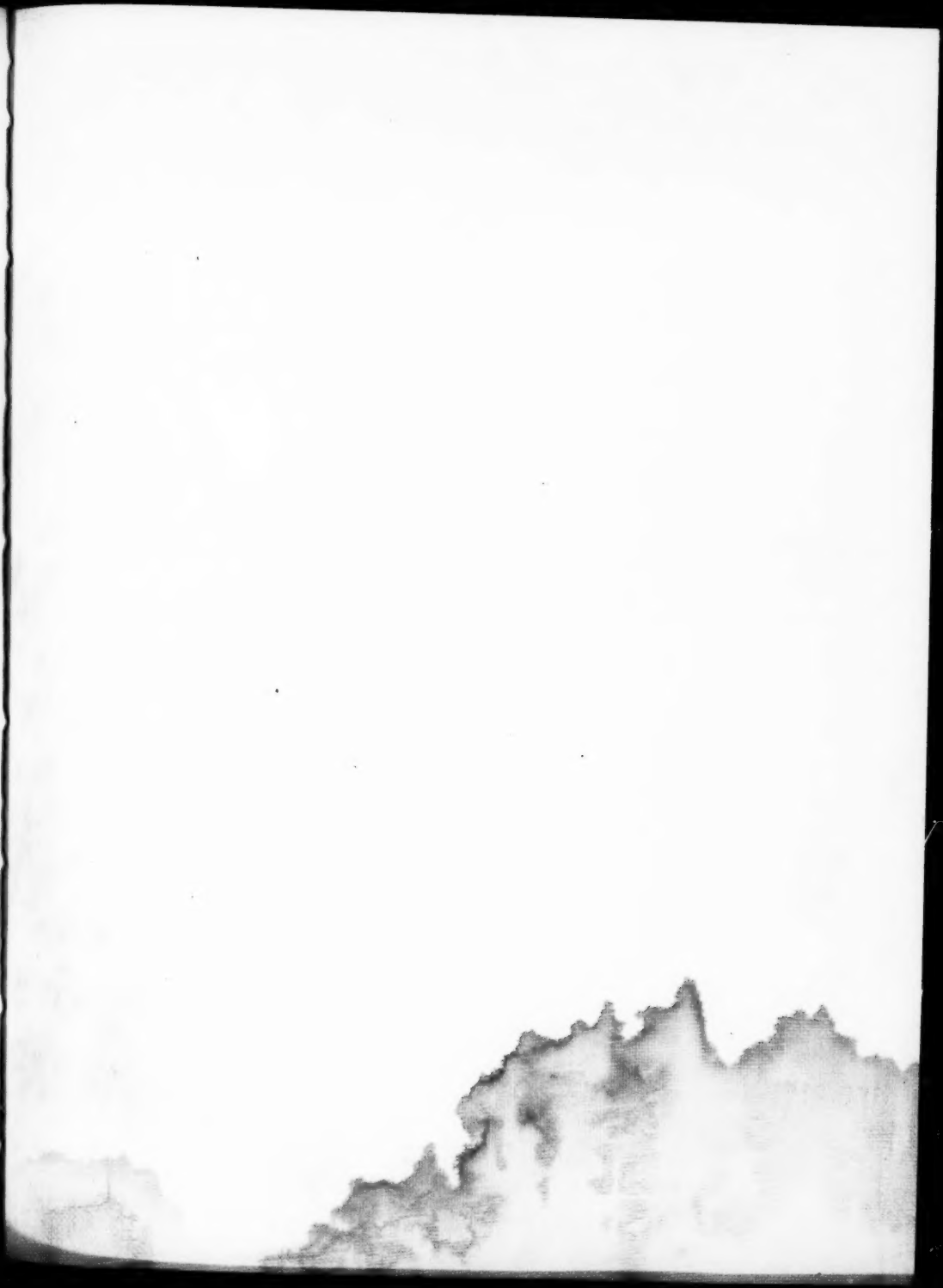

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1903.